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Hou

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(54) **AIR-CLEANING DECORATIVE HUMIDIFIER**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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F24F 6/02 (2006.01)
F24F 6/00 (2006.01)

(52) **U.S. Cl.**

CPC **F24F 6/02** (2013.01); **B01F 3/0407** (2013.01); **B01F 3/04021** (2013.01); **F24F 2006/003** (2013.01)

(58) **Field of Classification Search**

CPC B01F 3/04; B01F 3/04021; B01F 3/0407; B01F 3/04007
USPC 261/34.1, 78.2, 119.1, 142, DIG. 65
See application file for complete search history.

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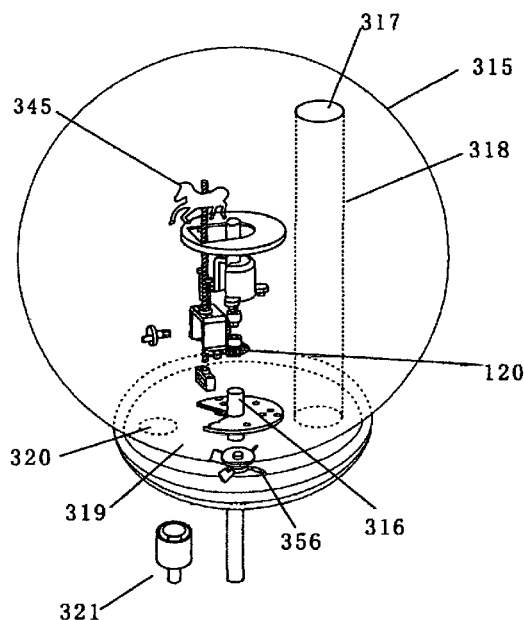
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Primary Examiner — Robert A Hopkins

(57) **ABSTRACT**

An air-cleaning decorative humidifier, including mainly a support seat, a water receptacle, at least a shaft, a fan, and a water sub-receptacle; in which a base seat of the water receptacle is fixed to the bottom of the water receptacle; a first water opening is provided on the base seat of the water receptacle; a water valve is provided on the first water opening; the fan and the water sub-receptacle are provided in the support seat; a water level control rod is provided in the water sub-receptacle; the shaft is connected with at least a decoration directly or through a mechanism.

20 Claims, 24 Drawing Sheets



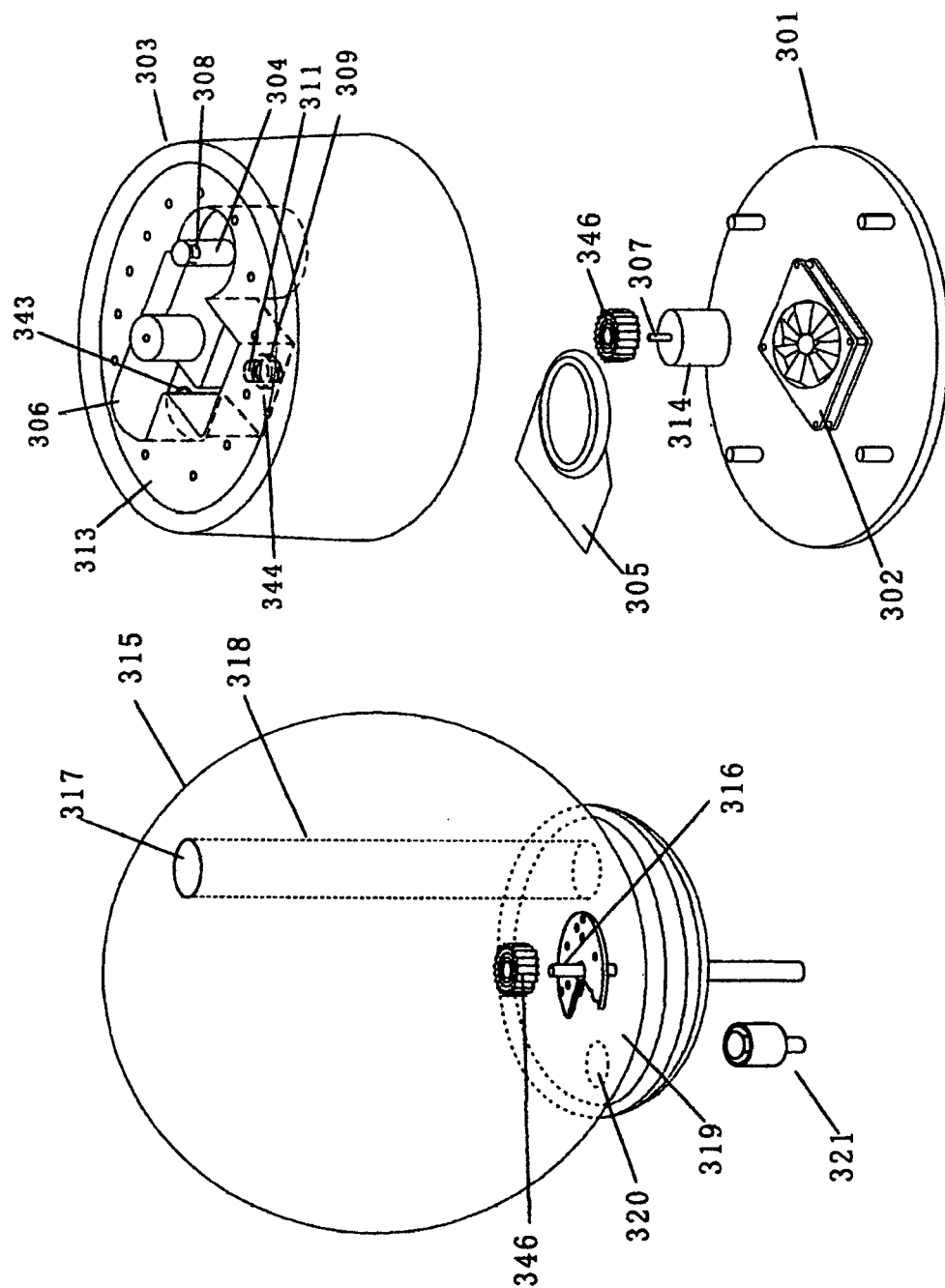
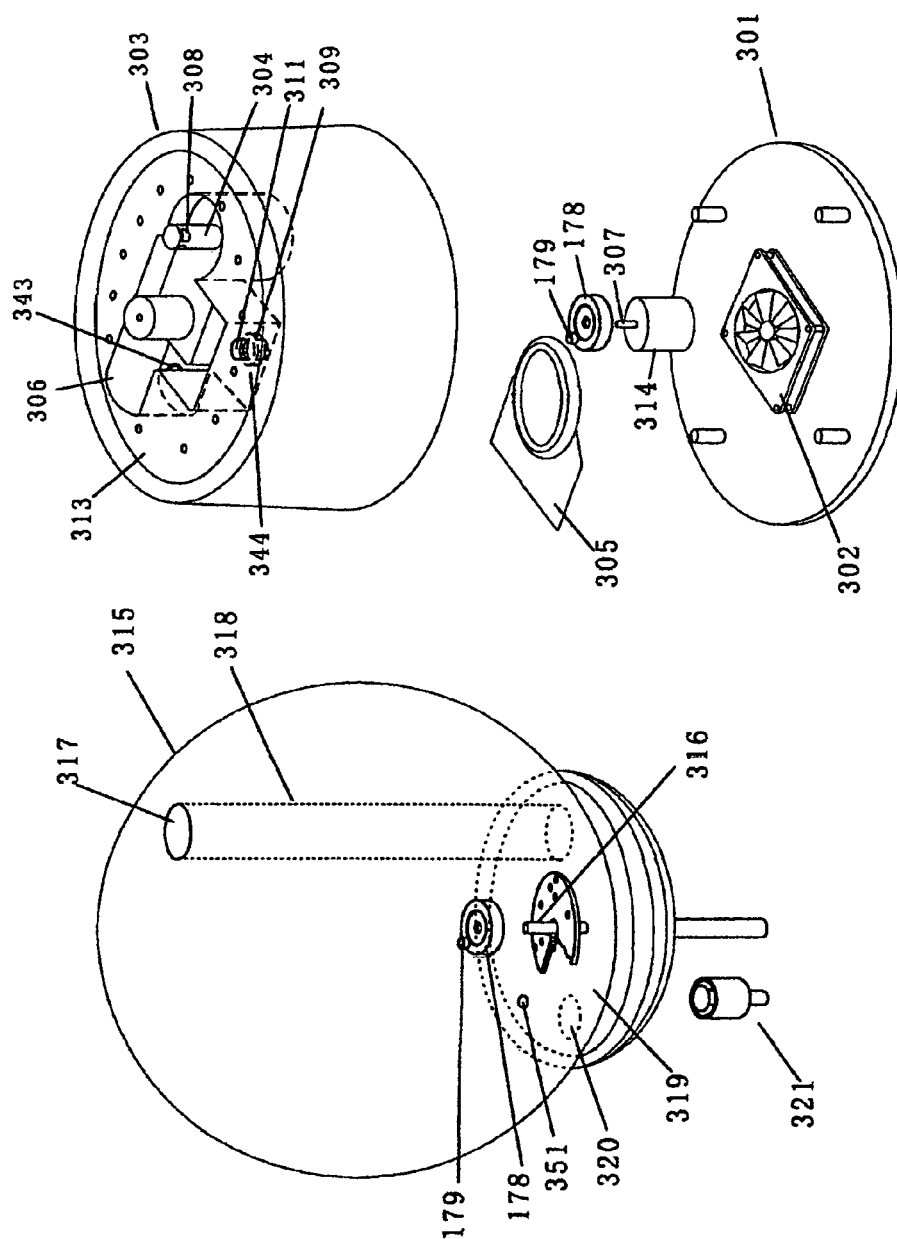
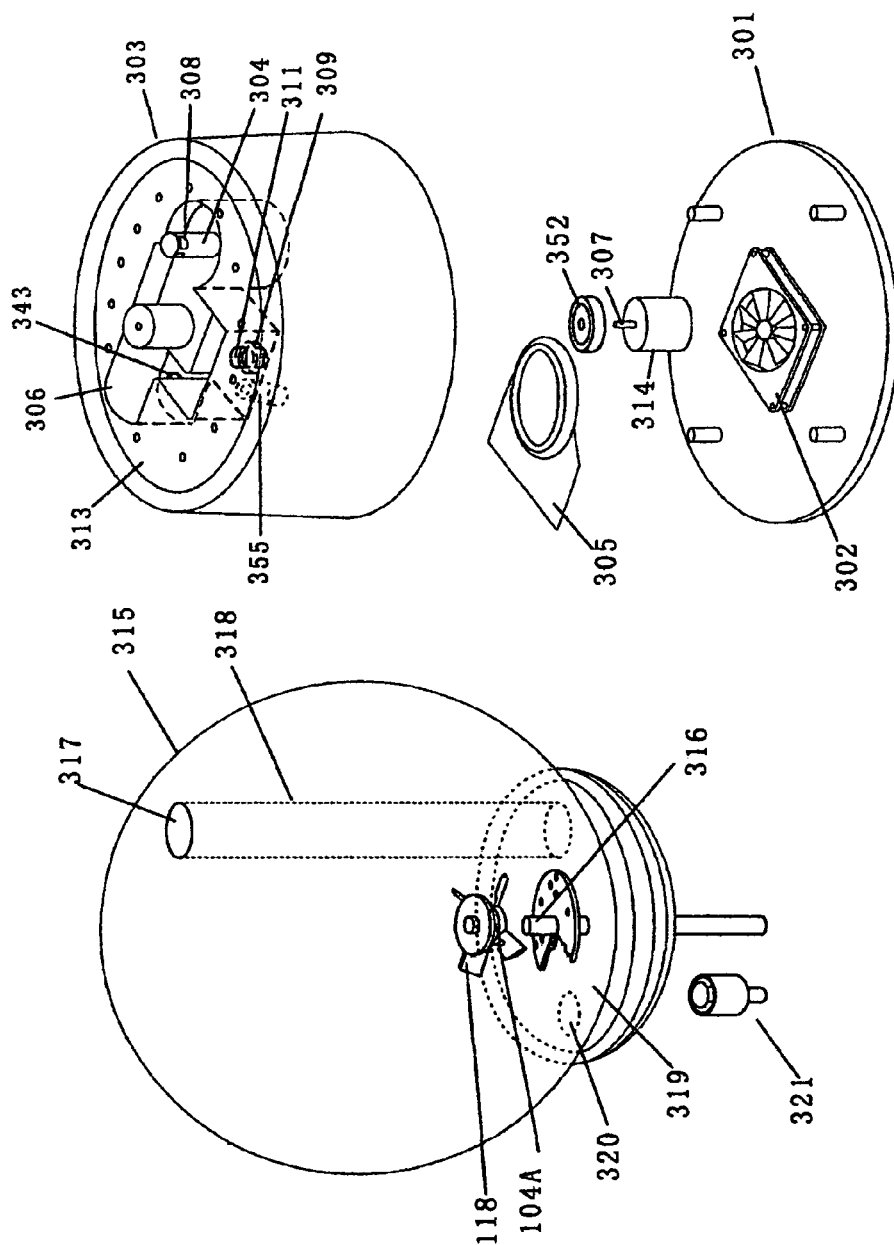
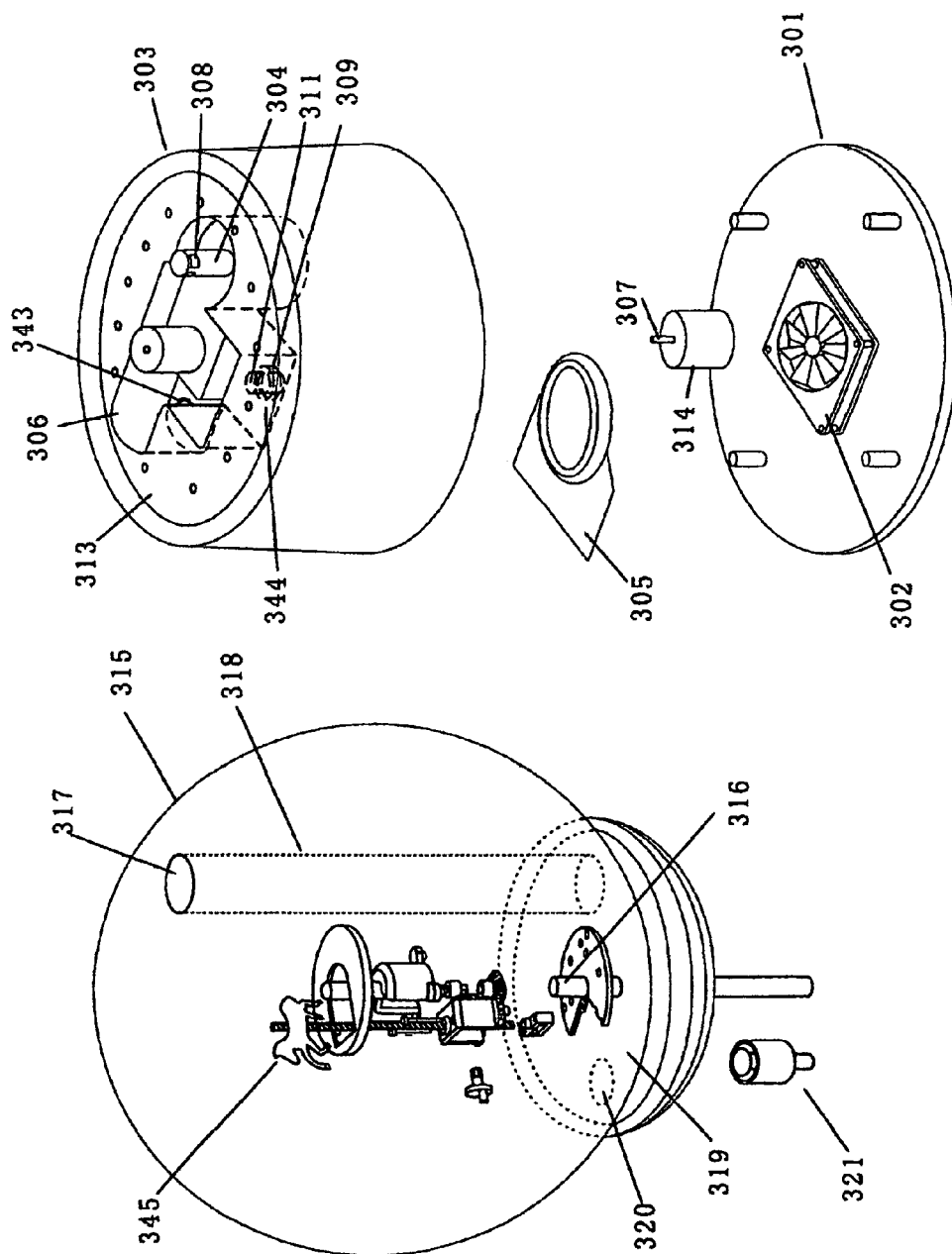


FIG 1







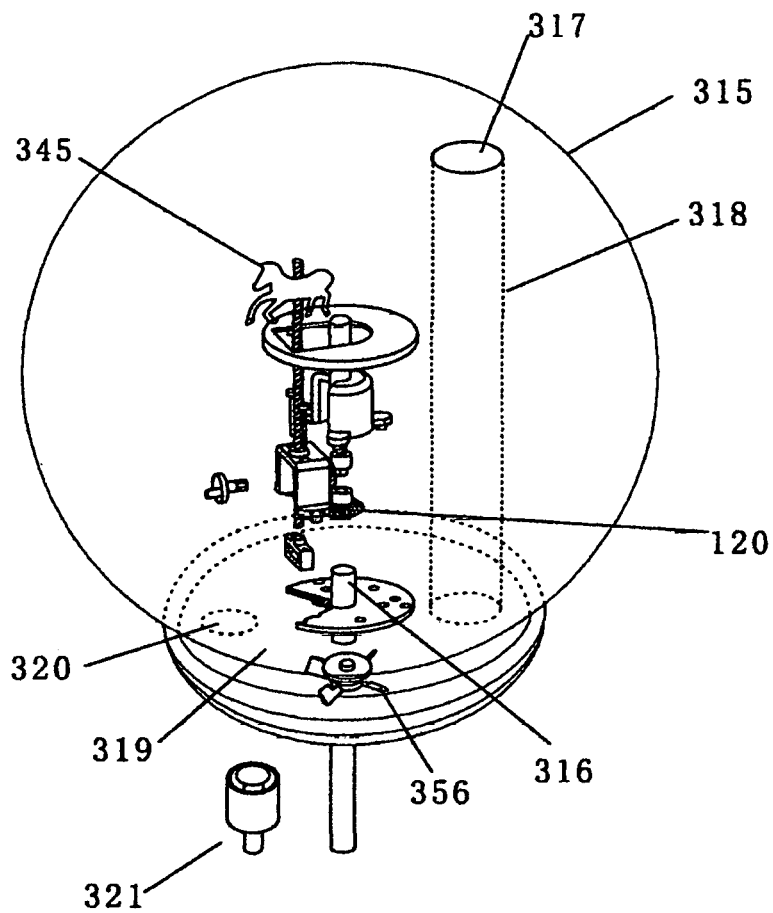


FIG 5

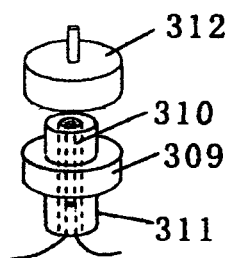


FIG 6

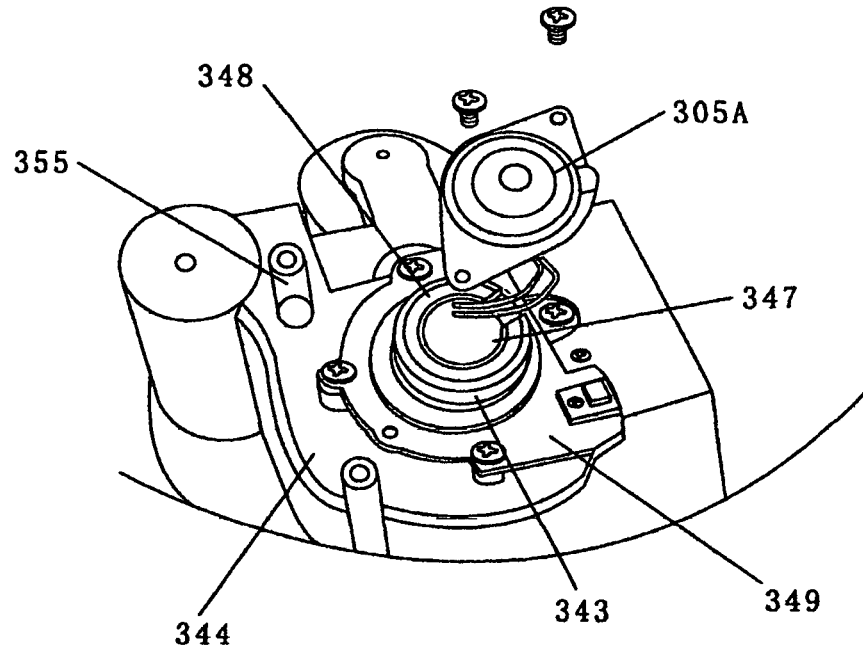


FIG 7

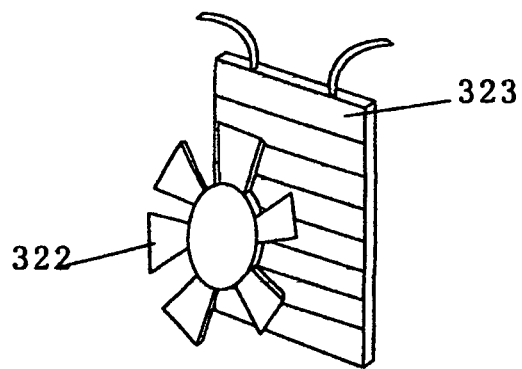


FIG 8

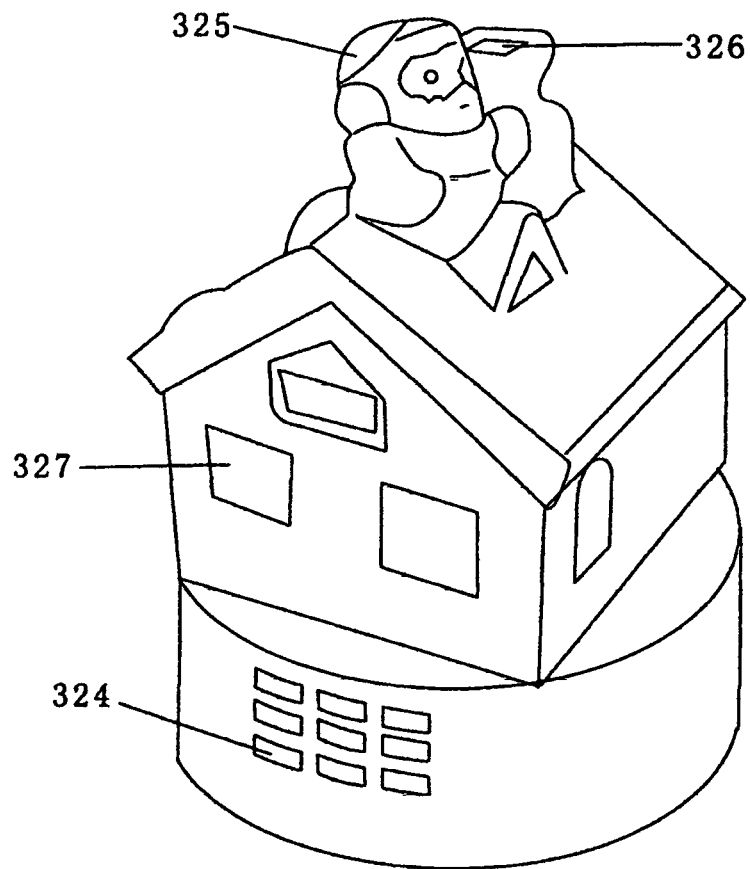


FIG 9

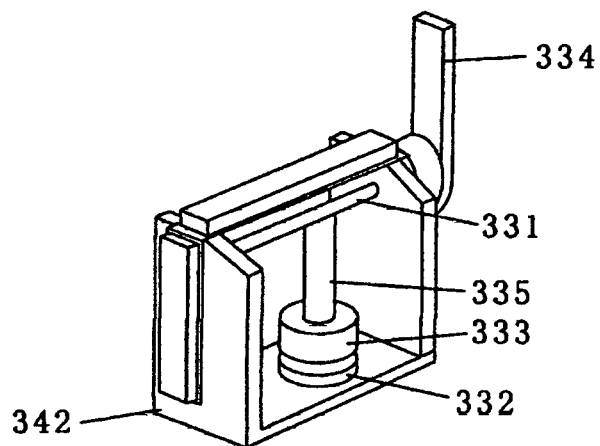


FIG 10

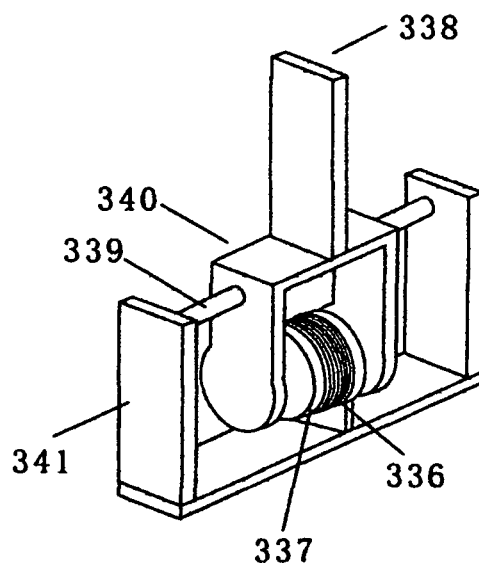


FIG 11

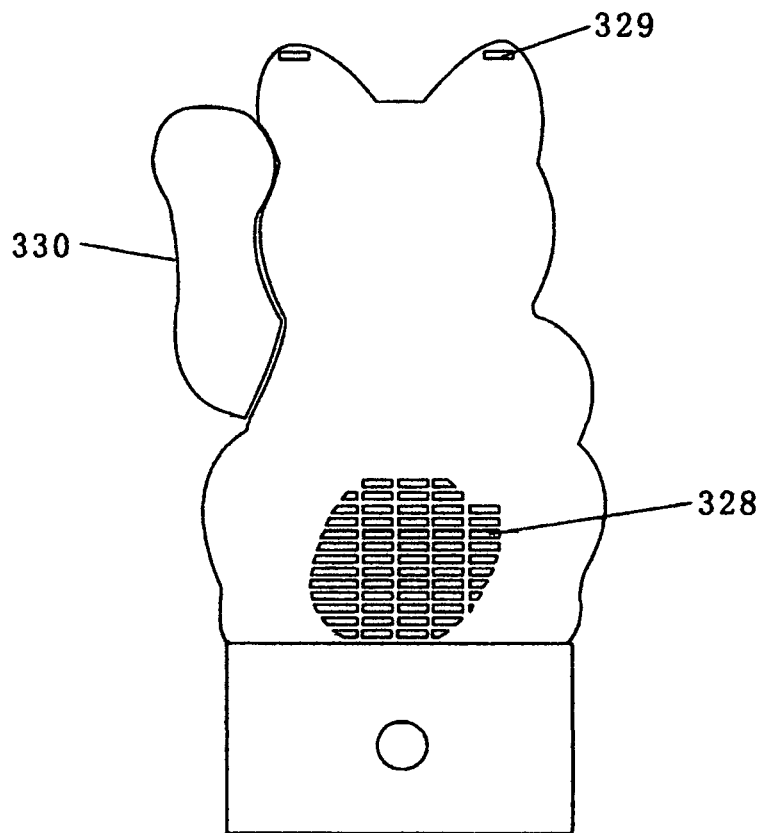


FIG 12

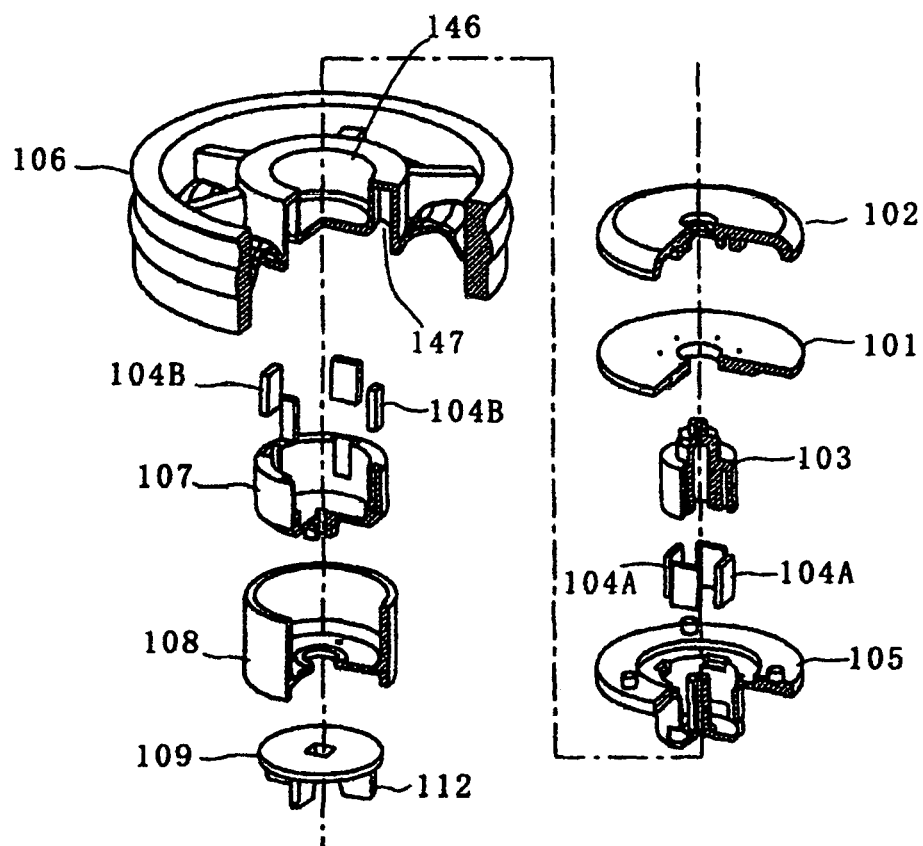


FIG 13

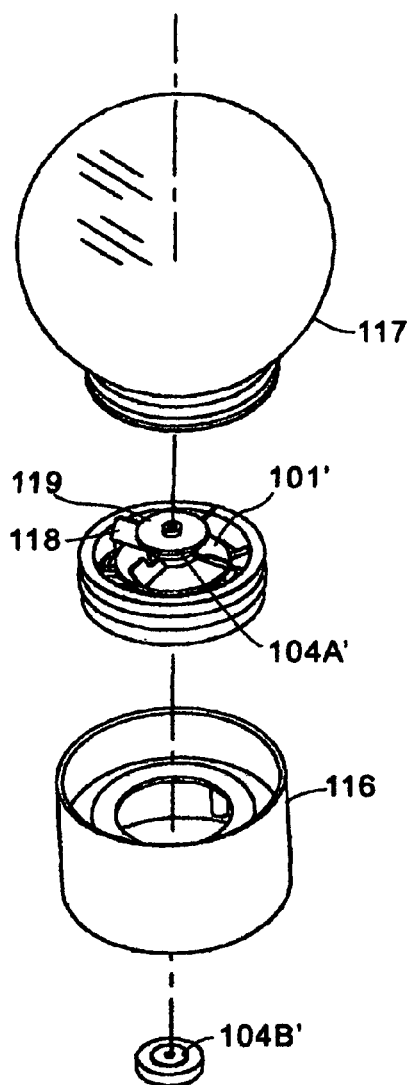


FIG 14

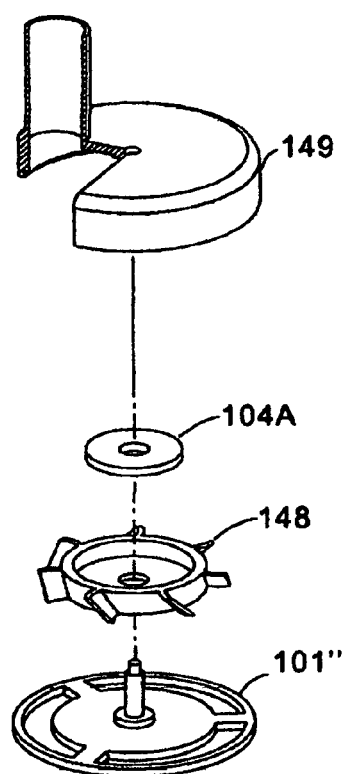
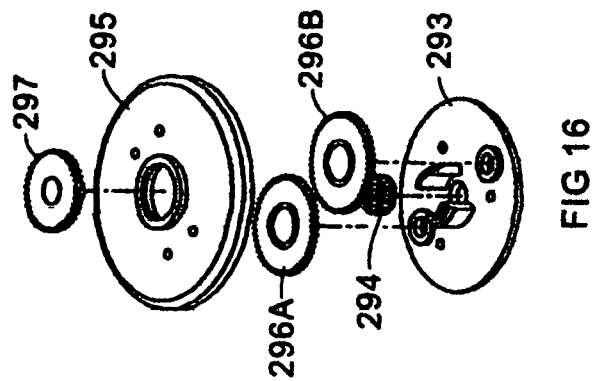
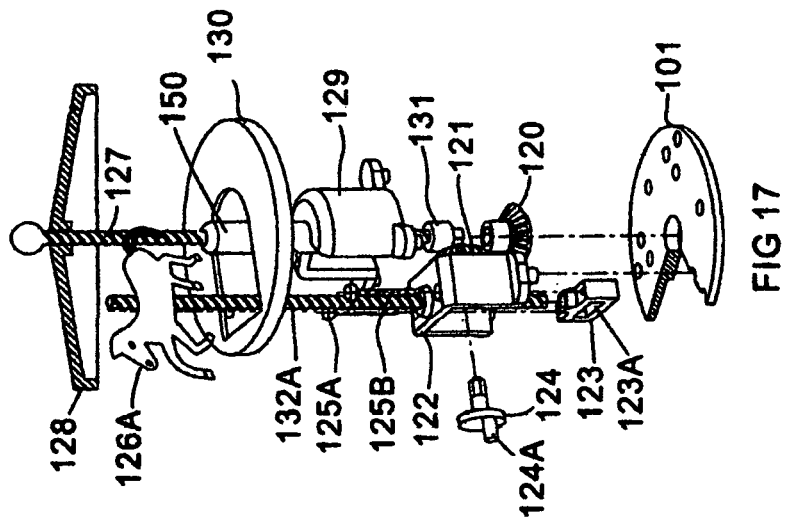
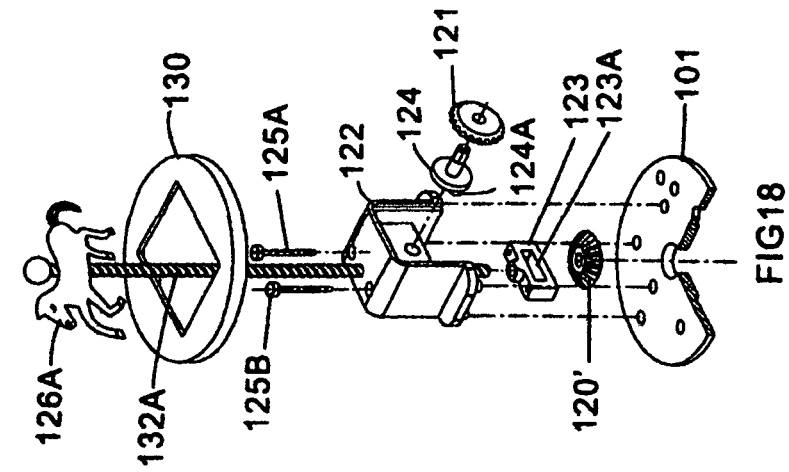


FIG 15



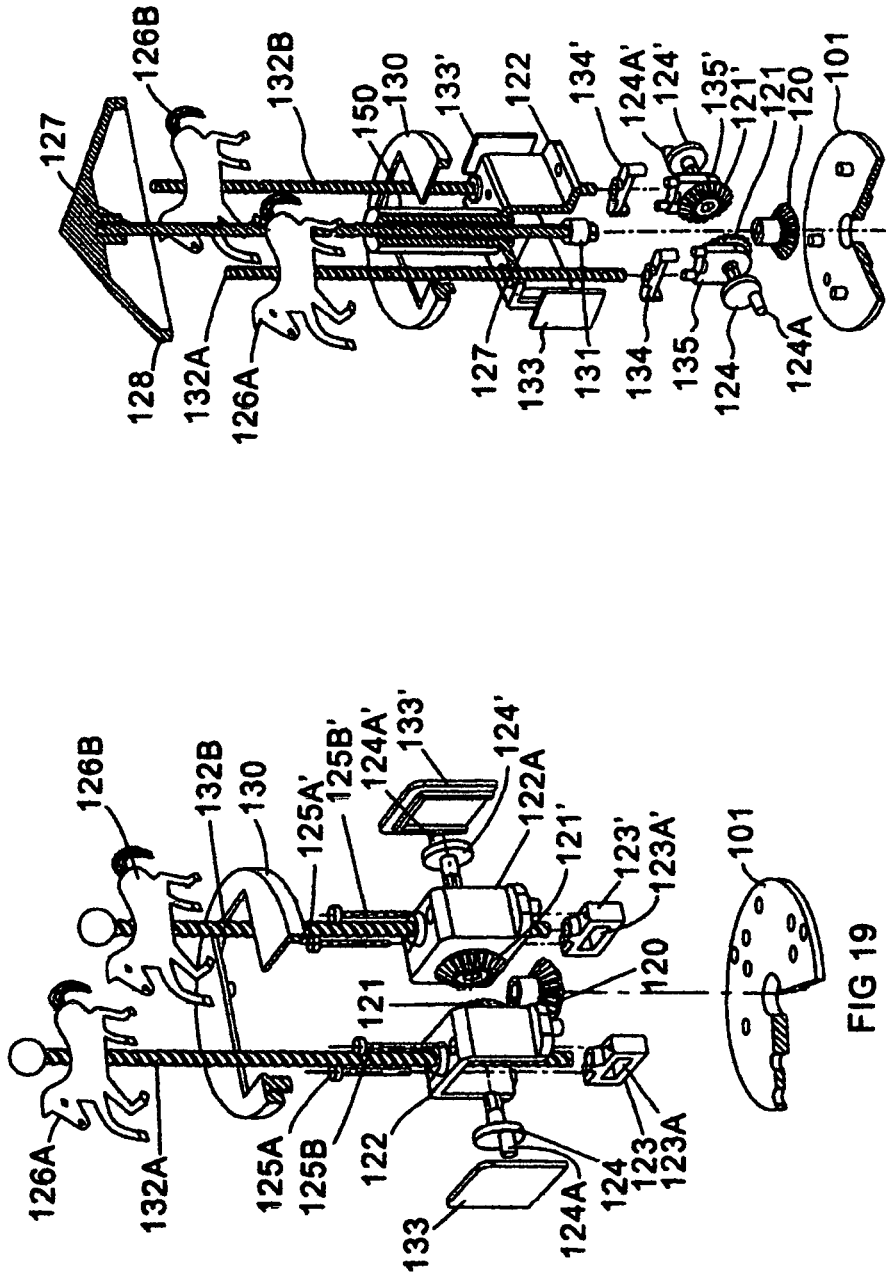


FIG 20

FIG 19

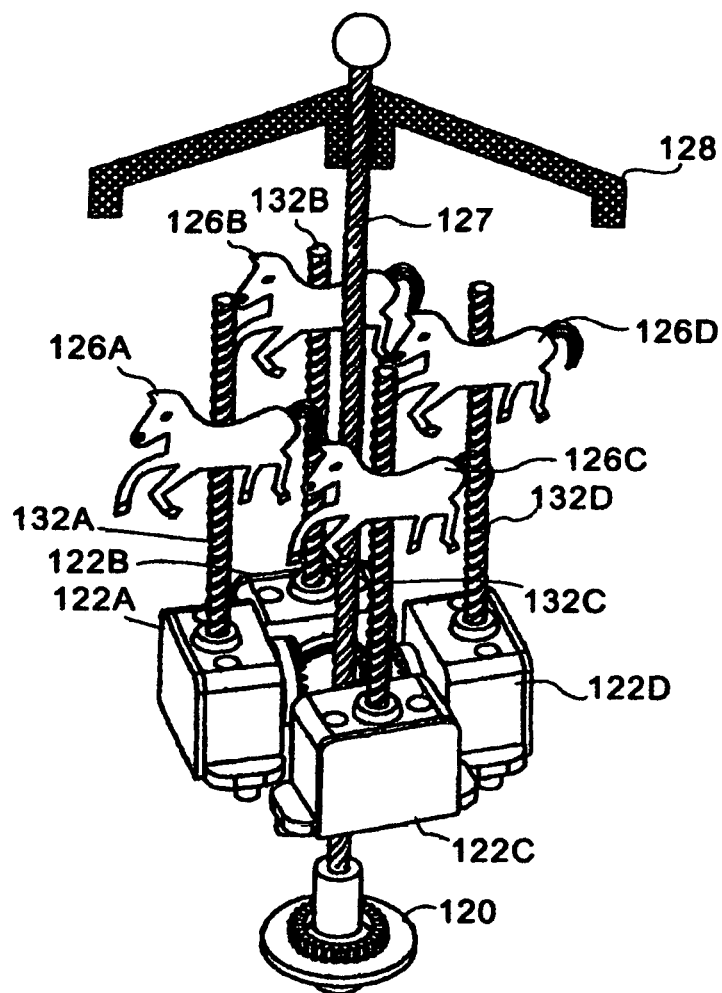


FIG 21

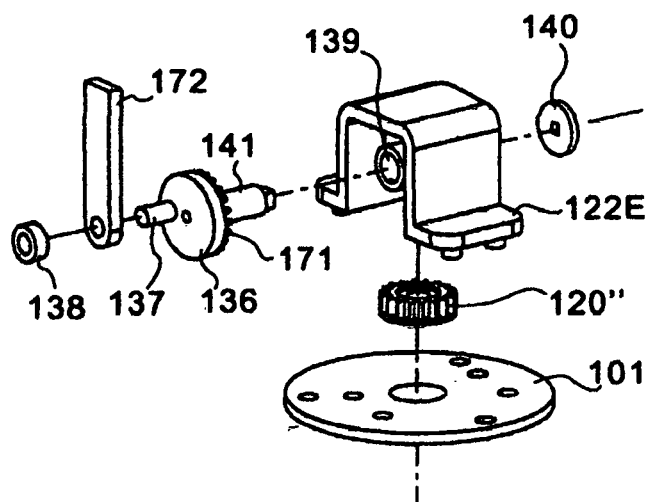


FIG 22

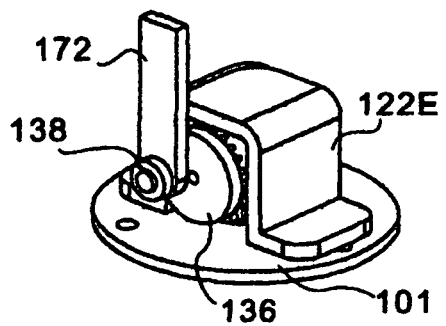
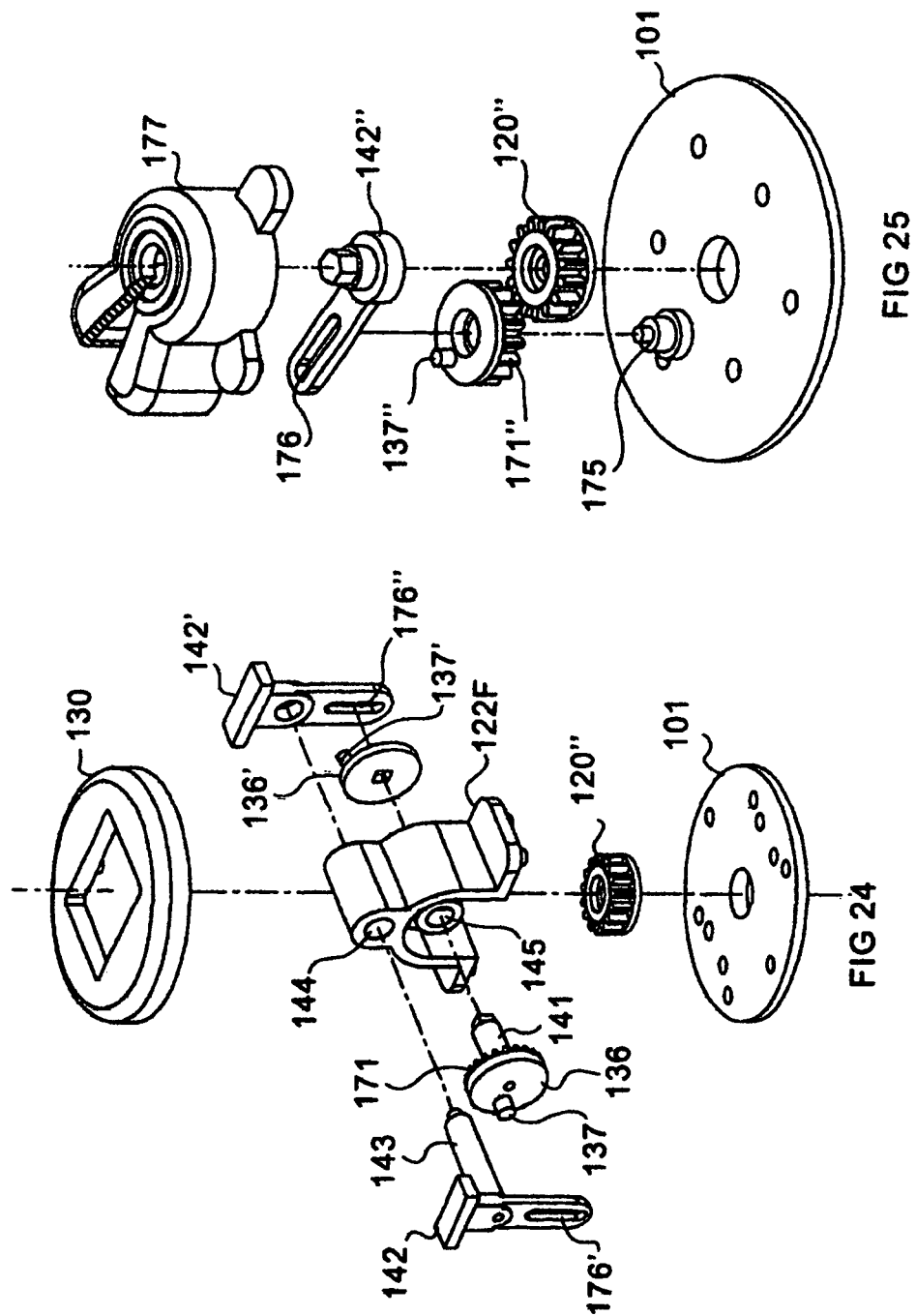


FIG 23



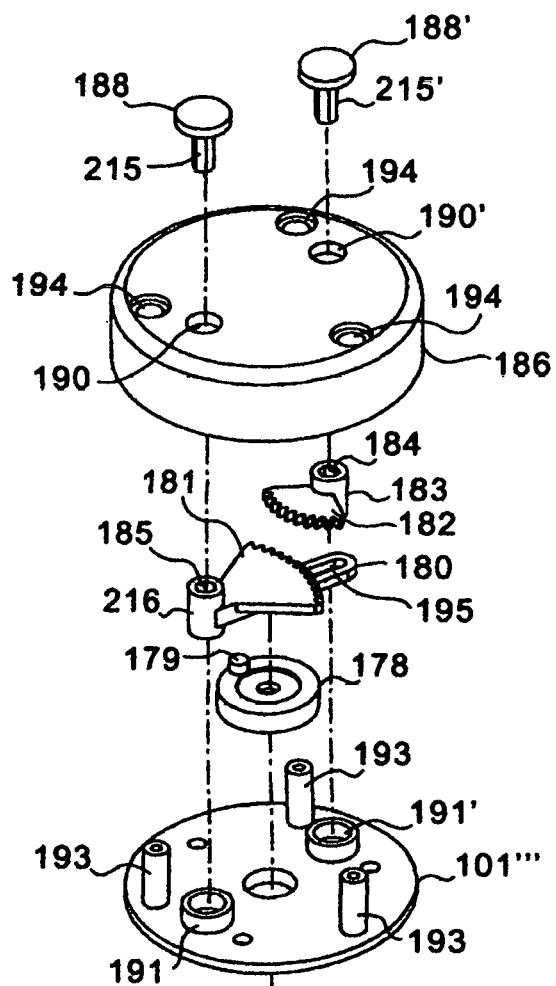
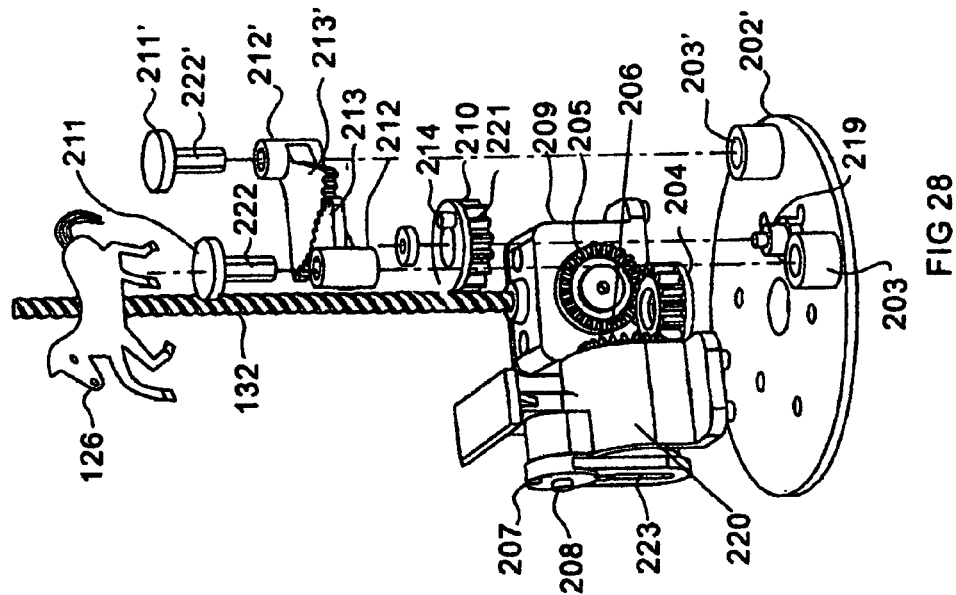
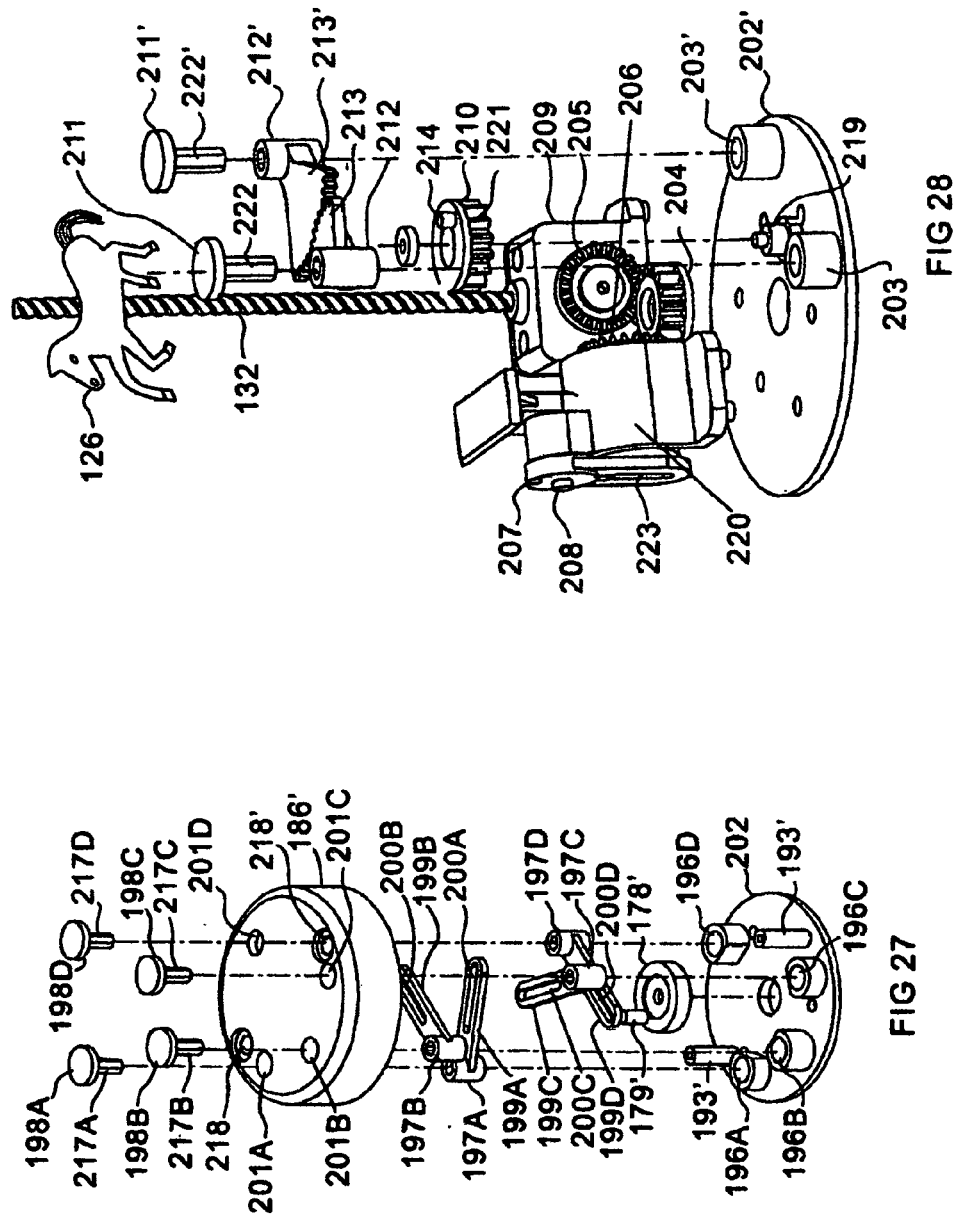


FIG 26



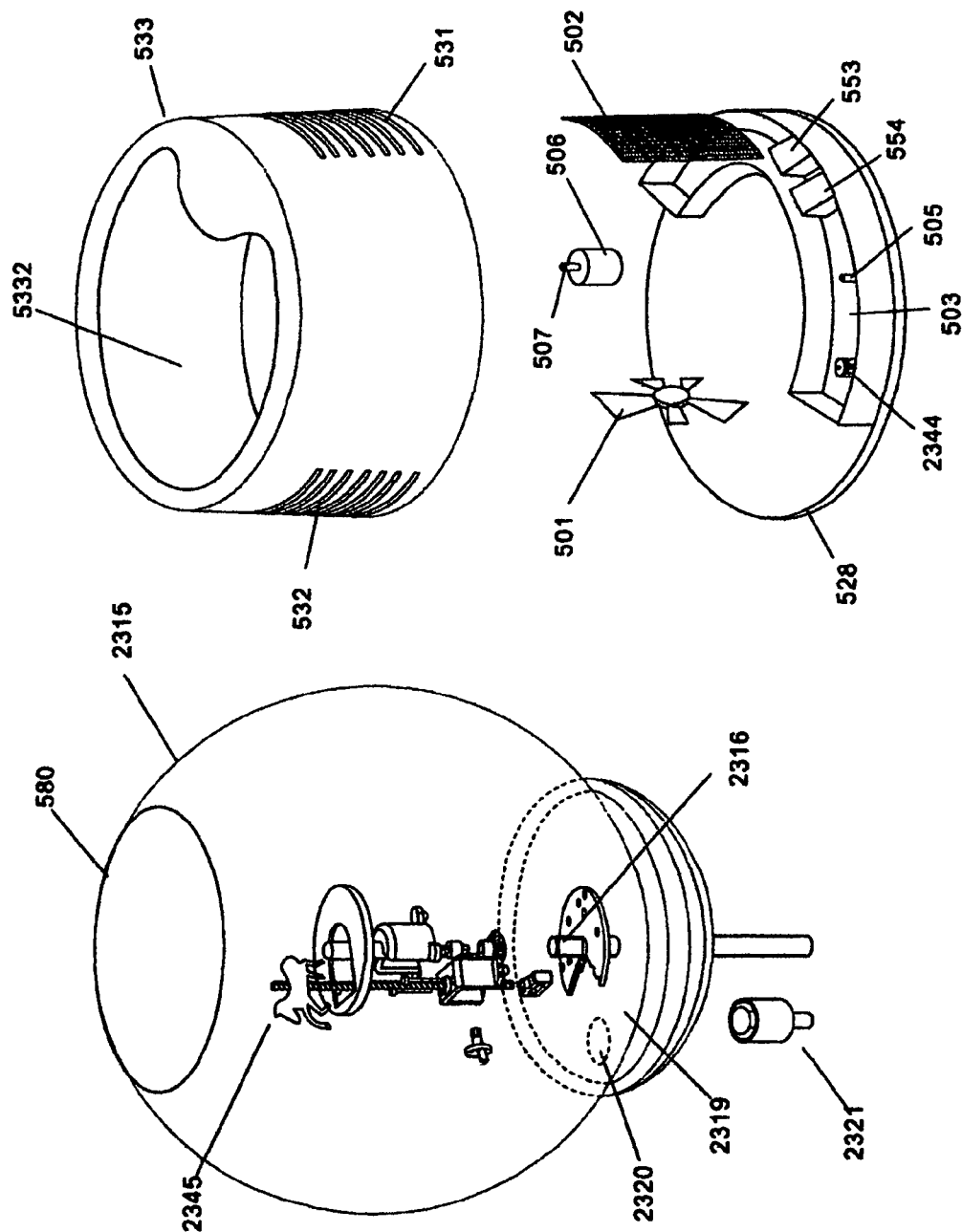
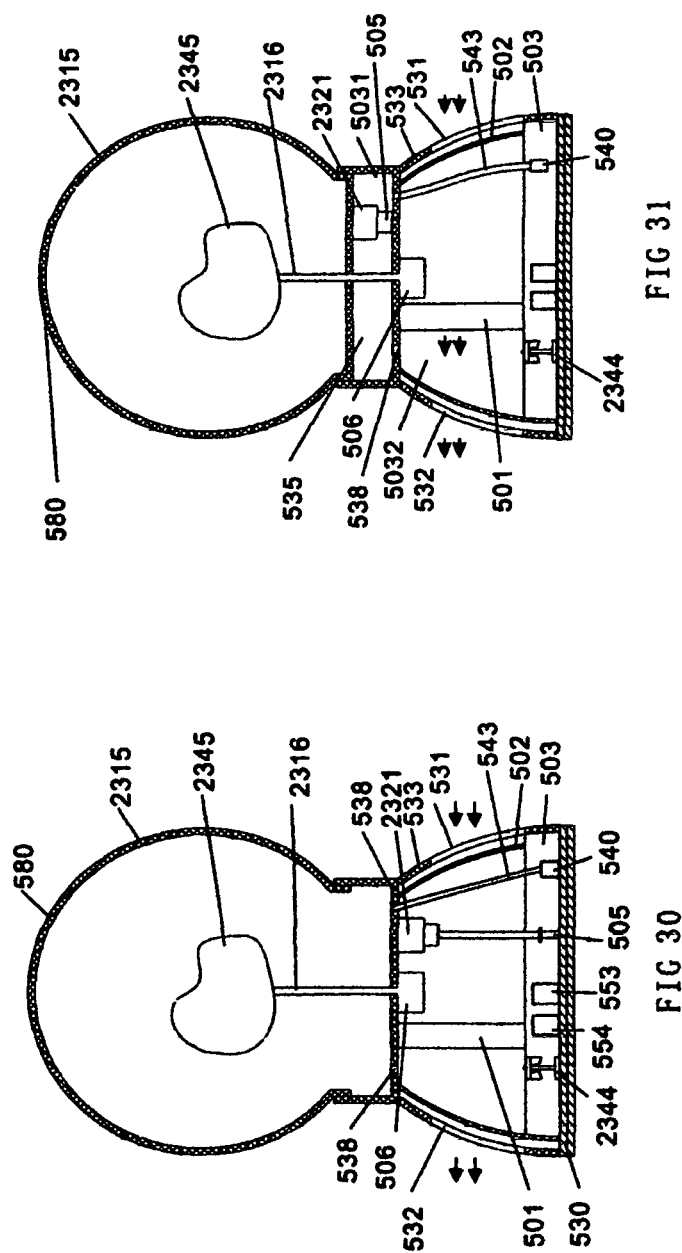
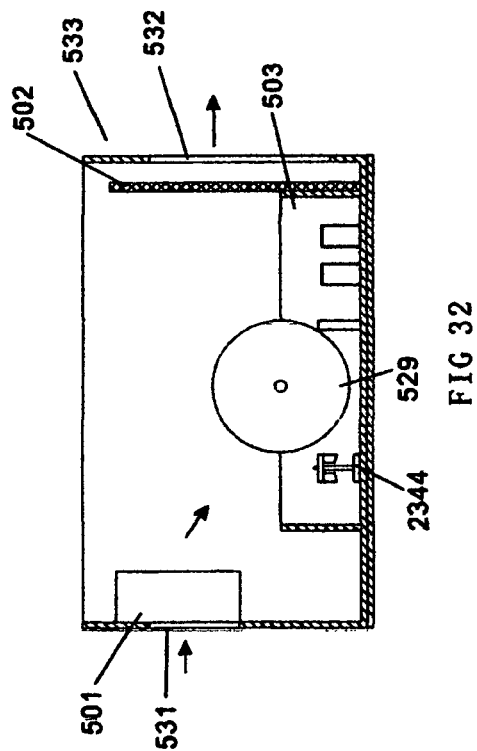
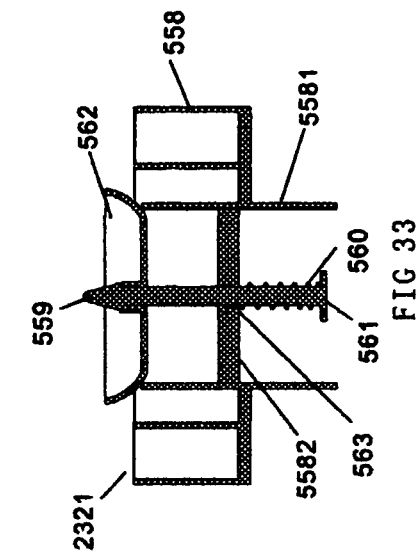
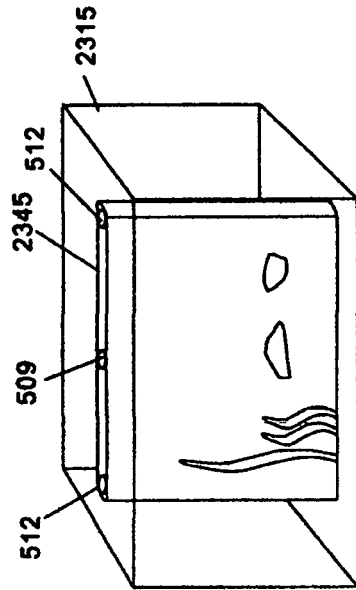
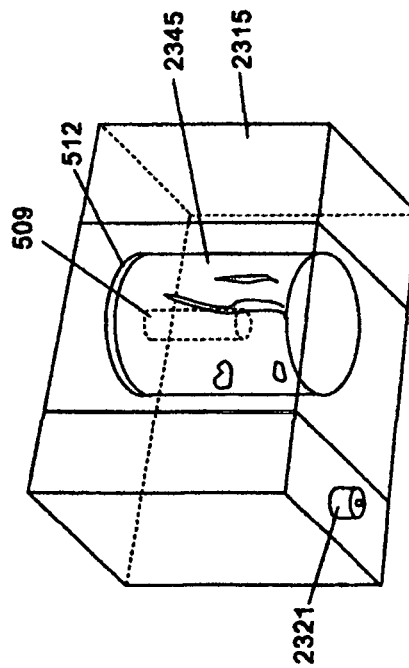


FIG 29







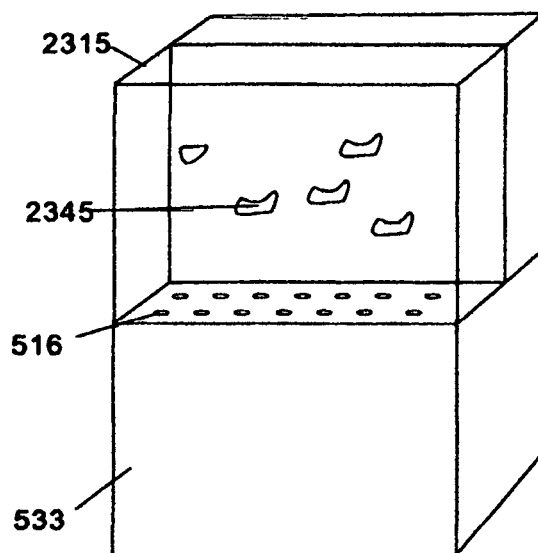


FIG 36

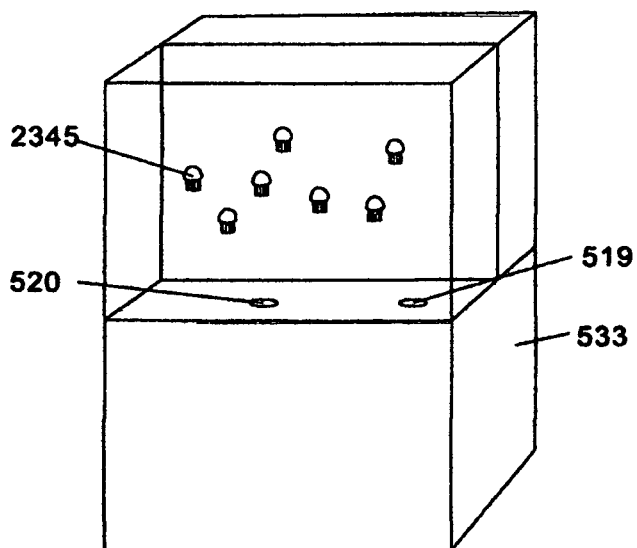


FIG 37

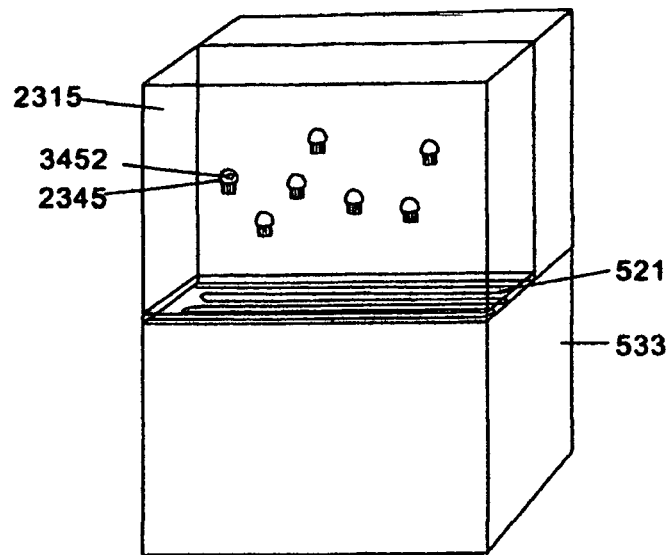


FIG 38

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AIR-CLEANING DECORATIVE HUMIDIFIER**CROSS REFERENCE OF THE RELATED APPLICATION**

The present applicant is a continuation application of the application of Ser. No. 12/232,396, filed on May 20, 2008 now U.S. Pat. No. 8,371,559, and the application of Ser. No. 12/232,396 is a CIP application of Ser. No. 12/078,815, filed on Apr. 7, 2008 now U.S. Pat. No. 8,025,270, entitled "decorative humidifier".

FIELD OF THE INVENTION

This Invention relates to a humidifier in particular to a humidifier than can provide a function of decoration.

BACKGROUND OF THE INVENTION

The conventional humidifiers mostly serve the purpose of humidifying the air or the rooms, and are rarely being decorative.

Various examples of conventional humidifiers or decorative structures are listed in the information disclosure statement.

SUMMARY OF THE INVENTION

The present invention relates to a humidifier that can provide a function of decoration, and filtering.

Furthermore, the humidifier of the present invention can provide not only vapor, but also ozone to the air or the rooms, and various embodiments of decorations, most of them involve some subassembly or moving mechanisms, can be used in this invention.

The decorative humidifier of the present invention can also be served as an air cleaner.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates an exploded view of the first embodiment of the present invention;

FIG. 2 illustrates an exploded view of the second embodiment of the present invention;

FIG. 3 illustrates an exploded view of the third embodiment of the present invention;

FIG. 4 illustrates an exploded view of the fourth embodiment of the present invention;

FIG. 5 illustrates an exploded view of the fifth embodiment of the present invention with some structures (e.g., for example a base seat, a base plate, and relevant parts) not shown in this figure;

FIG. 6 depicts an automatic safety device for the humidifier;

FIG. 7 depicts a ultrasonic device for transforming water into vapor;

FIG. 8 depicts another device for transforming water into vapor;

FIG. 9 illustrates a decoration that can be attached to the humidifier of the present invention;

FIGS. 10 and 11 illustrates two moving mechanisms used with a decoration shown in FIG. 12;

FIG. 12 illustrates another decoration that can be attached to the humidifier;

FIGS. 13, 14, . . . , 27, and 28 illustrate a first, second, . . . , fifteenth, and sixteenth subassembly, respectively, than can be used with the embodiments shown in FIGS. 1-5;

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FIG. 29 illustrates an exploded view of the embodiment A of the present invention, in which the structures of FIGS. 6, 8-28, and 30-38 can also be used with this embodiment;

FIG. 30 illustrates an exploded view of the embodiment B of the present invention, in which the structures of FIGS. 6, 8-29, and 31-38 can also be used with this embodiment;

FIG. 31 illustrates an exploded view of the embodiment C of the present invention, in which the structures of FIGS. 6, 8-30, and 32-38 can also be used with this embodiment;

FIG. 32 is a longitudinal sectional view of a support seat of the embodiments A-C of the present invention, having a single water wheel, in which the structures of FIGS. 6, 8-28, and 30-38 can also be used with this structure;

FIG. 33 is a longitudinal sectional view of a water exit valve, this structure can also be used with the structures of FIGS. 1-5, and 29-38;

FIG. 34 is an extended mechanism which can be used with the structures of FIGS. 1-33, and 36-38;

FIG. 35 is another extended mechanism which can be used with the structures of FIGS. 1-33, and 36-38;

FIG. 36 is another extended mechanism which can be used with the structures of FIGS. 8-35, 37, and 38;

FIG. 37 is yet another extended mechanism which can be used with the structures of FIGS. 8-36, and 38; and

FIG. 38 is yet another extended mechanism which can be used with the structures of FIG. 1-37.

DETAILED DESCRIPTION OF THE INVENTION

The first to fifth embodiments of the present invention shown in FIGS. 1-5 essentially are the same as each other except that in FIG. 1, a power source 314 having a shaft 307 which is operatively connected to a gear 346 are provided with the humidifier on a base plate 301 and a base board 319; in FIG. 2, a power source 314 having a shaft 307 which is operatively connected to a wheel 178 with an elongate drive stub 179 are provided with the humidifier on a base plate 301 and a base board 319, a light 351 is provided on the base board 319; in FIG. 3, a power source 314 having a shaft 307 which is operatively connected to a magnet 352 are provided with the humidifier on a base plate 301, a vane (fan) 118 and a magnet 104A are provided on the base board 319; in FIG. 4 simply the power source 314 having a shaft 307 are provided with the humidifier on a base plate 301, and a subassembly 345 and another shaft 316 are shown in a water receptacle 315; in FIG. 5, a fan 356, another shaft 316 and a subassembly 345 are provided in a water receptacle 315.

Please see FIGS. 1-4 for the detailed structure of the humidifier of the present invention. The humidifier mainly includes a base plate 301, a base seat 303, a water receptacle 315, a fan 302 installed on the base plate 301, a power source 314 (which can be a motor, a music box or the like), a shaft 307 of the power source 314, a sub-receptacle of water 306 in the base seat 303, a ultrasonic device 305 for transforming water into vapor, and a base board 319 of the water receptacle 315. The water receptacle 315 and the base board 319 are attached and sealed together so that the water in the water receptacle 315 does not leak through the border between the water receptacle 315 and the base board 319.

A water opening 320, a water exit valve 321, a vapor guide tube 318, and a vapor exit 317 are provided on the base board 319 for water receptacle 315. A spring not shown in the water exit valve 321 is provided for controlling the flow rate and on/off of the water flow downwardly from the water receptacle 315 through the base board 319, to the sub-receptacle for water 306. A shaft 316 operatively connected to the shaft 307 can be fastened with a gear 346. An opening not shown the

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drawing can be provided on the upper side of the water receptacle 315 to refill water, the water receptacle 315 is fixed on top of the base seat 3.

An air guide to be 304 with an air opening 308 is provided on the sub-receptacle for water 306. Numeral 311 designates a water separation tube which is shown in FIG. 6; numeral 344 designates a base face of the sub-receptacle 306 for water; numeral 343 designates an opening where an ultrasonic device 305 (for transforming water into vapor) is installed next to it. The detailed structure of the ultrasonic device 305 is shown in FIG. 7. The ultrasonic device 305 can be replaced with a heater, a fan, or other conventional device for transforming water into vapor. Numeral 313 designates an upper face of the base seat 305.

When the humidifier is to be used, the water receptacle 315 is filled with water, the water can flow through the water opening 320 and into the sub-receptacle of water 306. The humidifier is turned on, the ultrasonic device 305 generates vapor. The fan 302 on the base plate 301 sucks air from the space under the fan 302 upwardly, forces the air to go through the air guide tube 304, toward the air opening 308. A recessed space is formed around the vapor guide tube 318 and the air guide tube 304 at the base board 319 for collecting vapor there. The air which is forced through the air opening 308 pushes the vapor through the vapor guide tube 318 and forces the vapor to exit through the vapor exit 317.

From the right upper half of FIG. 1, we can see that the air guide tube 304 is higher than the sub-receptacle of water 306 and the upper face 313 of the base seat 303, and the upper face 313 contacts tightly with the base board 319 of the water receptacle 315, therefore the water would not flow downward through the air opening 308.

When the power source 314 is turned on, the shaft 307 and the shaft 316 on top of the what 307 rotates to move the subassembly or the decoration (shown in e.g. FIGS. 13-28) operatively connected therewith.

Numeral 355 in FIGS. 3 and 7 designates an ozone mechanism for delivering ozone into the water in the sub-receptacle of water 306 under the water receptacle 315, so that the water therein contains ozone and the vapor from the humidifier also contains ozone. Alternatively, the ozone mechanism 355 can also be provided on the base seat 303. The fan 302 on the base plate 301 sucks air from the space under the fan upwardly, forces the air and the zone to go through the air guide tube 304, toward the air opening 308, so that the air, ozone, and vapor go through the vapor guide tube 318 and exit through the vapor exit 317.

In FIGS. 4 and 5, a subassembly 345 can be installed in the water receptacle 315. Alternatively, the subassemblies or structures shown in FIGS. 9, 12 and 16-28 can also be installed therein.

In FIG. 5, a fan 356 and the subassembly 345 are installed in the water receptacle 315 so that the fan 356 and the subassembly 345 (or other subassemblies or structures shown in FIGS. 8, 9, 12, 16-28) can be rotated simultaneously.

FIG. 6 depicts an automatic safety device for the humidifier, which is installed at the base face 344 of the sub-receptacle of water 306 on the base seat 303. The automatic safety device includes mainly a water separation tube 311, a sensing piece 310 in the water separation tube 311, a magnetic float 309 around the water separation tube 311, and a fixed head 312. When the sub-receptacle of water 306 is filled with water, the magnetic float 309 floats, thus the magnetism of the magnetic float 309 is sensed by the sensing piece 310 and the power is energized. On the other hand, when there is not enough water in the sub-receptacle of water 306, the magnetic float 309 drops downwardly, and the power is deenergized.

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This mechanism can be used in other drawings or embodiments of the humidifier of this invention.

FIG. 7 depicts a detailed structure of the ultrasonic device 305 for transforming wafer into vapor, in which numeral 347 designates an ultrasonic sheet which is surrounded with a rubber sheet 348. A printed circuit board 347 is provided for the ultrasonic device 305. An opening 343 is provided on the sub-receptacle of waster 306 of the base seat 303. Numeral 344 designates a base face of the sub-receptacle of water 306. An upper lid 305A holds the ultrasonic sheet 347 and the rubber sheet 348 in place, so that the water would not leak. When the humidifier is activated, the ultrasonic sheet 347 is activated to transform the water in the sub-receptacle of water 306 into vapor.

FIG. 8 depicts an alternative device for transforming water into vapor, in which a numeral 323 designates heating sheets 323 and a numeral 322 designates a fan. When the humidifier is activated, the fan 322 blows air and/or water through the heating sheets 323. The heating sheets can also be used for heating the water in the receptacle 315 or the sub-receptacle of water 306. they can be also used in the other embodiments of the present invention, e.g., they can be used in FIGS. 9 and 12.

FIG. 9 illustrates a decoration that can be attached to the humidifier, in which the vapor can exit through a vapor exit 326. The decoration 325 can be moved by a moving mechanism described in this invention so that it can move outside of the water receptacle 315. A light bulb (not shown in the drawings) can be provided on the base seat 302 of FIGS. 1-4 so that light beams can go out through windows 327. The heating sheets 323 and the fan 322 (shown in FIG. 8) can be installed inside of the air exits 324 so that heated air can exit from the air exits 324.

FIG. 12 illustrates another decoration that can be attached to the humidifier, and FIGS. 10-11 illustrate two moving mechanisms used with the decoration of FIG. 12. The moving mechanisms shown in FIGS. 10-11 include mainly a coil 332, 336; a magnet 333, 337; a shaft 339, 331; a rocking arm 334, 338; a rocking rod 335, 340; and a fastening frame 341, 342. when the coil 332, 336 is energized, a magnetic force is generated, the rocking rod 335, 340 moves back and forth, thus the rocking arm 334, 338 moves therewith. This makes an arm 330 in FIG. 12 moves back and forth. Numeral 329 in FIG. 12 designates a vapor exit from which a vapor can exit. If the heating sheets 323 and the fan 322 shown in FIG. 8 is used in this embodiment, a vapor and hot air can exit from an exit 328, or just hot air can exist from the exit 328.

The mechanisms shown in FIG. 10-12 can also be used with other embodiments of this invention.

FIGS. 13-28 have basically been shown in a U.S. Pat. No. 6,978,654 (hereinafter designated as '654) invented by the same inventor as that of the present invention. FIGS. 13, 14, . . . , 27, and 28 illustrate a first, second, . . . , fifteenth, and sixteenth subassembly, respectively, that can be used with the embodiments shown in FIGS. 1-5.

FIG. 13 basically is the same as FIG. 1 of '564, but without the musical box and relevant parts shown on the left side thereof. In FIG. 13 the first magnets 104A and the second magnets 104B are for transmitting a movement from a power source from under a stopper member 106 to over the stopper member. A first rotary member 103, a second rotary member 107, a connecting member 105, and a lid 101 can further be provided. The first magnets 104A are installed in the first rotary member 103, the second magnets 104B are installed in the second rotary member 107, the connecting member 105 is fastened to the stopper member 106 and is provided for rotatably accommodating the first rotary member 103, the lid 101

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is installed on the connecting member **105** for preventing the first rotary member **103** from falling off. The stopper member **106** can be provided with a first recessed portion **146** for accommodating the first rotary member **103** and the connecting member **105**, and a second recessed portion **147** for accommodating the second rotary member **107**.

The second rotary member **107** is fastened to the rotary piece **109** so as to rotate therewith. A socket member **108** which can be fastened to the stopper member **106** is for accommodating the second rotary member **107** so as to confine or stabilize the movement of the second rotary member **107**. Numeral **102** designates a support on which a figurine or a subassembly can be positioned.

A rotary coupler **112** provided with the rotary piece **109** can be engaged with the shaft **307** or **316** of FIGS. 1-4 or other embodiments so that the subassembly shown in FIG. 13 can be in the water receptacle **315**. The stopper member **106** can be rubber, metal, plastic or other suitable material.

FIG. 14 is the same as FIG. 4 of '564 but without the musical box and relevant parts. In FIG. 14, the subassembly has a decorative base member **116**, a transparent housing **117**, at least a first magnet **104A**, and at least a second magnet **104B**, at least one vane **118** fastened to the first magnet **104A** for agitating some particles in the transparent housing **117** so that it looks like some flurries are moved upwardly and falling down. A lid **101** for installing the vane **118** and the magnet **104A**; and another lid **119** provided to prevent the vane **118** and the magnet **104A** falling off. The subassembly can work with the magnet **352** shown in FIG. 3 or the shaft **307** or **316** and FIGS. 1-4, or other embodiments, so that it can be in the water receptacle **315**.

FIG. 15 is the same as FIG. 5 of '564, in which the subassembly includes a rotary member **148** and a magnet **104A** positioned in a lid **101**; and a lid **149** covering the lid **101**, the rotary member **148**, and the magnet **104A** and has an opening so that the particles agitated by the rotary member **148** can exit. This subassembly can be connected to the shaft **307** or **316** and can work with other embodiments and be inside of the water receptacle **315**.

Please note that the subassemblies shown in FIGS. 16-28 cannot be inside of the water receptacle **315**, but also be outside of the water receptacle **315**.

FIG. 16 is the same as FIG. 7 of '564, in which a gear **294** over a lid **293** is connected with the shaft **307** or **316** shown in FIGS. 1-4, two gears **296A** and **296B** are located engageable with the gear **294**. The teeth of the gears **296A** and **296B** engage with teeth of a rotary cover **295**. The teeth of the rotary plate **295** are provided on the inside face of a vertical wall on the peripheral of the rotary cover **295**. When the shaft **307** or **316** rotates counterclockwise, the gear **294** does the same, and the gears **296A** and **296B**, and the rotary cover **295** rotate clockwise, and vice versa. A gear **297** can be fastened to the gear **294** or the rotary cover **295** so as to drive other elements not shown in the drawings. We can also eliminate the gear **297** and have a figurine or decoration mounted on the rotary cover **295**. The subassembly shown in FIG. 16 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **315**.

FIG. 17 is the same as FIG. 8 of '564, in which a gear **120** on a lid **101** can be connected with the shaft **307** or **316** shown in the FIG. 1-4. A connecting piece **131** is fastened to the gear **120** and is fixed with a rotary shaft **127** which is installed with a canopy **128**. A housing **129** is provided around the shaft **127** indirectly (with a tube **150** in between) to stabilize the rotation of the shaft. The purpose of the tube **150** is to protect the shaft **127**. A plate **130** is positioned around the shaft **127** for supporting some decoration (not shown in the drawings).

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Another gear **121** is engaged with the gear **120** and fastened with a wheel **124** which has an elongate drive stub **124A**. A housing **122** is fixed to the lid **101** and is provided around the wheel **124**. Another rotary shaft **132A** and two guiding rods **125A** and **125B** are vertically inserted through the housing **122**. A link **123** with a longitudinal slot **123A** is fastened to the lower end of the rotary shaft **132A**. A figurine (horse) **126A** is fastened to the upper part of the rotary shaft **132A**. The elongate drive stub **124A** is movably located in the longitudinal slot **123A**. The rotation of the gear **120** causes the rotation of the gear **121** and the wheel **124**, which in turn causes the up and down movement of the link **123**, the shaft **132A**, the guiding rods **125A** and **125B**, and the horse **126A**. The subassembly shown in FIG. 17 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **315**.

FIG. 18 is the same as FIG. 9 of '564, in which a gear **120'** on a lid **101** can be connected with the shaft **307** or **316** shown in rigs. 1-4. Another gear **121** is engaged with the gear **120** and fastened with a wheel **124** which has an elongate drive stub **124A**. A housing **122** is fixed to the lid **101** and is provided around the wheel **124**. Another rotary shaft **132A** and two guiding rods **125A** and **125B** are vertically inserted through the housing **122**. A link **123** with a longitudinal slot **123A** is fastened to the lower end of the rotary shaft **132A**. A figurine (horse) **126A** is fastened to the upper part of the rotary shaft **132A**. The elongate drive stub **124A** is movably located in the longitudinal slot **123A**. The rotation of the gear **120** causes the rotation of the gear **121** and the wheel **124**, which in turn causes the up and down movement of the link **123**, the shaft **132A**, the guiding rods **125A** and **125B**, and the horse **126A**. The subassembly shown in FIG. 18 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **315**.

FIG. 19 is the same as FIG. 10 of '564, in which a gear **120** over a lid **101** can be connected with the shaft **307** or **316** shown in FIGS. 1-4. Two other gears **121** and **121'** are engaged with the gear **120** and fastened with wheels **124** and **124'**, respectively, which have elongate drive stubs **124A** and **124A'** respectively. Housings **122** and **122A** are fixed to the lid **101** and are provided around the wheels **124** and **124'** respectively. Rotary shafts **132A** and **132B** and two pairs of guiding rods **125A**, **125B**, and **125A'**, **125B'** are inserted through the housings **122** and **122A** respectively. A plate **130** is provided around the shafts **132A** and **132B** for supporting some decoration (not shown in the drawings). Links **123** and **123'** with longitudinal slots **123A** and **123A'** respectively are fastened to the lower end of the rotary shafts **132A** and **132B** respectively. The elongate drive stubs **124A** and **124A'** are movably located in the longitudinal slots **123A** and **123A'** respectively. The rotation of the gear **120** causes the rotation of the gears **121** and **121'** and the wheels **124** and **124'**, which in turn causes the up and down movement of the links **123** and **123'**, the shafts **132A** and **132B**, the guiding rods **125A**, **125B**, **125A'** and **125B'**, and the horses **126A** and **126B**. Decoration plates **133** and **133'** are employed to cover a side of the housings **122** and **122A** respectively. The subassembly shown in FIG. 19 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle **315**.

FIG. 20 is the same as FIG. 11 of '564, in which a gear **120** over a lid **101** can be connected with the shaft **317** or **316** shown in FIGS. 1-4. FIG. 20 differs from FIG. 19 in that a connecting piece **131** is fixed to the gear **120** and is fastened with a rotary shaft **127** which is protected with a tube **150** and which is fastened with a canopy **128** on its top end. That is to say, all of the elements shown in FIG. 20, except the connecting piece **131**, the rotary shaft **127**, the tube **150**, and the

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canopy 128, can also be exactly the same as the third embodiment shown in FIG. 19, instead of those shown in FIG. 20. In FIG. 20, one housing 122 is employed to replace the two housings 122 and 122A shown in FIG. 19. Links 134 are fastened to the lower ends of the shafts 132A and 132B respectively for being moved by the elongate drive stubs 124A and 124A, respectively. Two connecting pieces 135 are employed for installing the wheels 124, 124' and the gears 121, respectively. The subassembly shown in FIG. 20 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIG. 21 is the same as FIG. 12 of '564, in which a gear 120 can be connected with the shaft 307 or 316 shown in FIG. 1-4. The subassembly shown in FIG. 21 is very similar to the fourth embodiment (FIG. 20) of the subassembly. In FIG. 21, there are four rotary shafts 132A, 132B, 132C, 132D for installing four horses 126A, 126B, 126C, 126D respectively. Four housings 122A, 122B, 122C, 122D are provided around the four rotary shafts 132A, 132B, 132C, 132D respectively. A rotary shaft 127 is installed on a bearing 120 and is fastened with a canopy 128. The subassembly shown in FIG. 21 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIGS. 22 and 23 are the same as FIGS. 13 and 14 of '564, in which a gear 120" over a lid 101 can be connected with the shaft 307 or 316 shown in FIGS. 1-4. A housing 122E can be fastened to the lid 101. A support tube 139 is provided on the housing 122E, for rotatably supporting a shaft 141. A wheel 136 and a gear 171 (which is engageable with the gear 120") are fixed on the shaft 144. An elongate drive stub 137 is provided on the wheel 136. The stub 137 can be inserted through a hole provided on a rod 172 on which a figurine or a decoration can be fixed. A ring 138 and a fastening piece 140 are fixed to the stub 137 and the end of the shaft 141, respectively. When the gear 120" rotates, the gear 171 and the wheel 136 rotate, thus in turn the stub 137 causes the rod 172 to do reciprocating movement. The subassembly shown in FIGS. 22 and 23 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIG. 24 is the same as FIG. 15 of '564, in which a gear 120" over a lid 101 can be connected with the shaft 307 or 316 shown in FIGS. 1-4. A housing 122F can be fastened to the lid 101. Two support tubes 144 and 145 can be formed on the housing 122F, for rotatably supporting shafts 141 and 143. A wheel 136 and a gear 171 (which is engageable with the gear 120") are fixed on one side of the shaft housing 122F 141. Another wheel 136' is fixed in the other side of the shaft 141. The wheels 136 are 136' are provided with elongate drive stubs 137 and 137', respectively. Connecting pieces 142 and 142' are fixed to the two ends of the shaft 141, respectively. Longitudinal slot 176' and 176", in which the elongate drive stubs 137 and 137' can slide respectively, are formed on the connecting pieces 142 and 142', respectively. Figurines or decorations can be positioned on the connecting pieces 142 and 142'. A plate 130 is provided for supporting figurines or decorations. When the gear 120" rotates, the gear 171, the shaft 141, and the wheels 136 and 136' rotate therewith, thus in turn causes the connecting pieces 142 and 142' to do reciprocating movement. The subassembly shown in FIG. 24 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIG. 25 is the same as FIG. 16 of '564, in which a gear 128" over a lid 101 can be connected with the shaft 307 or 316 shown in FIGS. 1-4. A rod 175 is fixed on the lid 101. A gear 171' and a wheel 136" having a through hole in the central portion thereof respectively are rotatably installed on the rod 175. The gear 171' is engageable with the gear 120". An

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elongate drive stub 137" is formed on the wheel 136". A connecting piece 142", on which a figurine or decoration can be fixed, is rotatably installed on top of the gear 120". The connecting piece 142" is formed with a longitudinal slot 176 in which the elongate drive stub 137" can slide. A lid 177 is positioned over connecting piece 142" for confining the movement of the connecting piece 142". When the gear 120" rotates, the gear 171', and the wheel 136" rotate, thus in turn causes a reciprocate movement of the connecting piece 142". The subassembly shown in FIG. 25 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIG. 26 is the same as FIG. 17 of '564, in which a wheel 178 having an elongate drive stub 179 can be connected with the shaft 307 or 316 shown in FIGS. 1-4. A plurality of tubes 193, 191, 180 having a longitudinal slot 195 is fixed with a tube 216 having a hole 185 and a gear plate 181. A tube 183 having a hole 184 is fixed with a gear plate 182. The elongate drive stub 179 is located in the longitudinal slot 195 and slideable therein when the wheel 178 rotates. A cover plate 186 is positioned on the lid 101" and is provided with holes 194, 190 and 196. The upper ends of the tubes 193 are fastened at the holes 194 of the cover plate 186. Two supports 188 and 188' for supporting figurines or decorations thereon are fixed with rods 215 and 215' respectively. The rods 215 and 215' are inserted through the holes 190 and 190' respectively, and fastened in the holes 185 and 184 of the tubes 216 and 183 respectively. The tubes 216 and 183 are rotatably installed in the tubes 191 and 191' respectively. When the wheel 178 rotates, the elongate drive stub 179 drives the moving piece 180, the tube 216 and the gear plate 181 which engages with the gear plate 182 to reciprocate. Thus this causes the gear plate 182, the tube 183, the rods 215 and 215', and the supports 188 and 188' to reciprocate. The subassembly shown in FIG. 26 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIG. 27 is the same as FIG. 18 of '564, in which a wheel 178' having an elongate drive stub 179' can be connected with the shaft 307 or 316 shown in FIGS. 1-4. A plurality of tubes 193', 196A, 196B, 196C, and 196D are provided on the lid. Rotary tubes 197A, 197B, 197C, and 197D are rotatably installed in the tubes 196A, 196B, 196C, and 196D respectively, and fastened with connecting pieces 199A, 199B, 199C, and 199D respectively, which are provided with longitudinal slots 200A, 200B, 200C, and 200D respectively. The elongate drive stub 179' can be inserted into the longitudinal slots 200A, 200B, 200C, and 200D and slide therein when the wheel 178' rotates. A cover plate 186' is positioned on the lid 202 and is provided with holes 218, 218', 201A, 201B, 201C, and 201D. Supports 198A, 198B, 198C, and 198D for supporting figurines or decorations thereon are fastened with rods 217A, 217B, 217C, and 217D respectively, which insert through the holes 201A, 201B, 201C, and 201D on the cover plate 186' respectively, and installed in the rotary tubes 197A, 197B, 197C, and 197D respectively. When the wheel 178' rotates, the elongate drive stub 179' drives the connecting pieces 199A, 199B, 199C, and 199D to reciprocate, and the rotary tubes 197A, 197B, 197C, and 197D to rotate, respectively. Thus the rods 217A, 217B, 217C, and 217D, and supports 198A, 198B, 198C, and 198D rotate respectively. The cover plate 186' is fastened to the upper ends of the tubes 193' at the holes 218 and 218'. The movement of the connecting pieces 199A, 199B, 199C, and 199D does not interfere with each other because they are on different heights (levels). The subassembly shown in FIG. 27 can work with

other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

FIG. 28 is the same as FIG. 19 of '564, in which a gear 204 can be connected with the shaft 307 or 316 shown in FIGS. 1-4. A rod 219 and tubes 203 and 203', are provided on the lid 202'. A gear 221 and a wheel 210 having an elongate drive stub 214 are rotatably provided on the rod 219. A gear 204 engageable with the gear 221 can be installed on a rotary rod 219 and tubes 103 (FIG. 1) and rotate therewith. A rotary tube 212 is fixed with a gear plate 213 which is engageable with a gear plate 213' fixed with a rotary tube 212'. A moving piece and a longitudinal slot (in which the elongate drive stub 214 slides) similar to the moving piece 180 and the longitudinal slot 195 shown in FIG. 17 are provided under the gear plate 213 and fixed to the rotary tube 212. Supports 211 and 211' for supporting figurines or decorations having rods 222 and 222' are fastened to the rotary tubes 212 and 212' respectively, with the rods 222 and 222' inserted into the tubes 212 and 212' respectively. When the wheel 210 rotates, the stub 214 drives the tubes 212 and 212', the gear plates 213, and 213', and the supports 211, and 211' to move. A housing 209 is fastened to the lid 202', with a rotary shaft 132 provided therethrough. A gear 205 (engageable with the gear 204) and a wheel with an elongate drive stub (not shown in the drawing) (similar to the gear 121 and wheel 124 with an elongate drive stub 124A in FIG. 8) can be installed on the housing 209. A link with a longitudinal slot (not shown in the drawing) (similar to the link 123 with the longitudinal slot 123A in FIG. 8) can be fixed to the lower end of the shaft 125. When the wheel 205 rotates, the shaft 132 and the horse 126 move upwardly and downwardly. Another housing 220 is fastened to the lid 202' with a gear 206 rotatably installed on it. The gear 206 is engageable with the gear 204. The inside structure of the housing 220 is similar to that shown in FIGS. 13 and 14 (i.e., a wheel with an elongate drive stub not shown in the drawing is fastened to the gear 206). A connecting piece 207 having a longitudinal slot 223 is rotatably installed on a shaft 208. The elongate drive stub in the housing 220 is located in the longitudinal slot 223 and can slide thereon. A figurine or a decoration can be fastened to the connecting piece 207. When the gear 206 rotates, the wheel rotates, the stub drives the connecting piece 207 to reciprocate. The subassembly shown in FIG. 28 can work with other embodiments or subassemblies and can be inside or outside of the water receptacle 315.

Other variations can be provided with the embodiments described hereinabove, e.g., a filter (not shown in the drawings) can be provided near the fan 302 for filtering the air.

FIGS. 29-31 show the structures of the embodiments A-C of the air-cleaning decorative humidifier of the present invention.

These embodiments show some structures that are different from those shown in FIGS. 1-5, while these embodiments are also for humidifying and cleaning the air, and can use similar shaft (e.g. shaft 307 or 316 of FIGS. 1-5, or shaft 507 or 2316 of FIG. 29), and can be used with the structures shown in FIGS. 6-28, and 34-38 so as to enhance the decorative and functional effects.

The embodiment A is shown in FIG. 29 and includes mainly a support seat 533 and a water receptacle 2315. The support seat 533 has a first opening 5332 in which a fan 501 is accommodated. The support seat 533 is also provided with a bottom lid 528, a water sub-receptacle 503, and a filter 502. An automatic safety device 2344 (which can be the same as or similar to that shown in FIG. 6) and a water level control rod 505 are provided in the water sub-receptacle 503. A base seat 2319 can be fixed in the water receptacle 2315. A first water exit 2320 is provided on the water receptacle 2315. A water

exit valve 2321 is provided on the first water exit 2320. A shaft 2316 is provided in the water receptacle 2315. An end of the shaft 2316 can be connected to a motor 506 (the shaft 2316 can be connected to a motor of the fan 501 instead of motor 506). Likewise, an end of the shaft 507 can be connected to the motor 506, or to a motor of the fan 501. The other end of the shaft 2316 or 507 can be connected with a decoration 2345, or be connected with the mechanisms shown in FIG. 8-28, or 34-38 first, and then connected with a decoration 2345. An opening can be provided on the water receptacle 2315 which is covered with a lid 580 which can be opened so that water can also be filled into the water receptacle 2315. A wind exit (opening) 532 and a wind inlet (opening) 531 are provided on the support seat 533. The water receptacle 2315 is fixed on the support seat 533. The lid 580 and the support seat 530 can also be formed integrally. When the water receptacle 2315 is filled with water, the water falls through the first water exit 2320 and water exit valve 2321, then falls through the water level control rod 505 and enters the water sub-receptacle 503. The water level in the water sub-receptacle 503 is controlled by the water exit valve 2321 and the water level control rod 505. When the power of the present invention is turned on, the fan 501 is activated to draw air which enters through a wind inlet 531, passes through a filter 502 (so that the air can be cleaned), and exits through a wind exit 532. The lower end of the filter 502 also can be submerged in the water in the water sub-receptacle 503, and the filter 502 can also be made of water-absorbent material, so that the water can go up and make the filter 502 wet and so that when wind passes through the filter 502, the water will evaporate and the air can be humidified. Various decorations 2345 can be used with the present invention. A bag 553 which can contain ice cubes, air freshener, aromatic material, or the like, and an air cleaner 554 also can be put in the water sub-receptacle 503 to enhance the function of the present invention.

The motor 506 can be used to drive the shaft 2316 (FIGS. 29-31) so as to drive the decorations 345 in the water receptacles shown in FIGS. 4-5, the decorations 2345 in the water receptacles shown in FIGS. 34-35, or the decorations and the mechanisms in the water receptacles shown in FIGS. 13-28 (e.g. magnets 104B in FIGS. 13-14, vane 118 in FIG. 14, fan 322 in FIG. 8, gears 294, 120, and 120' in FIGS. 16-18 respectively, and eccentric wheels 124, 141, 178, and 178' in FIGS. 17, 22, 26 and 27 respectively).

FIG. 29 just exemplifies a mechanism in the water receptacle 2315. The motor 506 can also drive the fan 501 if necessary. The motor for driving the fan 501 can also be used for driving the shaft 2316.

The motor 506 can be used to drive the shaft 507 so as to drive the decorations outside of the water receptacle through the mechanisms shown in FIGS. 8-28, and 34-38 (e.g. decorations 2345 in FIGS. 34-35, decorations 126A, 126B in FIGS. 8-28, decorations 325 in FIG. 9, or arm 330 in FIG. 12). The shaft 507 also can be connected to the magnets 104B in FIGS. 13-14, or the fan 322 in FIG. 8, ears 294, 120, and 120' in FIGS. 16-18 respectively, and eccentric wheels 124, 141, 178, and 178' in FIGS. 17, 22, 26 and 27 respectively, or a belt conveyer and be connected to the decorations through the mechanisms outside of the water receptacle. FIGS. 9 and 12 show decorative multi-function fan. In FIG. 9, when the wind is blown from the air exit 324, the shaft 507 (shown in FIG. 29) can move the decoration 325 shown in FIG. 9. In FIG. 12, when the wind is blown from the exit 328, the shaft 507 (shown in FIG. 29) can link with the mechanisms shown in FIGS. 10-11 and move the decoration 330 shown in FIG. 12, the shaft 507 can also move some decorations directly.

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FIG. 30 shows the embodiment B of the present invention. Embodiment B is similar to embodiment A shown in FIG. 29. In FIG. 30, a water pump 540 is connected with a water pipe 543, at least one second water exit 538 is provided on top of the support seat 533. The water pump 540 pumps water into the water receptacle 2315 through the water pipe 543. When the fan 501 is turned on the wind blows toward a water curtain (water falls) formed with the water in the water receptacle 2315 which flows downwardly from the second water exit 538. The air in the wind can be cleaned because it goes through the water curtain (falls). The water can then flow into the water sub-receptacle 503, and then into the water receptacle 2315 through the water pump 540 and the water pipe 543. This movement occurs repeatedly and the air can be cleaned with minimum energy. The mechanisms shown in FIGS. 8-28, and 32-38 also can be used with this structure.

FIG. 31 shows the embodiment C of the present invention. An upper chamber 5031 and a lower chamber 5032 are provided on the support seat 533. The water sub-receptacle 503 and the fan 501 are provided on the lower chamber 5032. A water reservoir 535 is provided in the upper chamber 5031. A second water exit 538 is provided on one side of the water reservoir 535. When the water receptacle 2315 is filled with water, the water in the water receptacle 2315 enters the water reservoir 535 through the water exit valve 2321 and the water level control rod 505. The water level in the water reservoir 535 is controlled with the water exit valve 2321 and the water level control rod 505. As an alternative, an independent water reservoir (not shown in the drawings) can be provided around the water level control rod 505. The independent water reservoir is separate from the second water exit 538, so that the water in the water receptacle 2315 does not discharge through the second water exit 538 completely. An opening 531 and an opening 532 are provided on the support seat 533 (the opening 531 can be wind inlet, the opening 532 can be wind exit, and vice versa). A filter 502 can be provided inside of the opening 531, a bag 553 which can contain ice cubes, air freshener, aromatic material, or the like, and an air cleaner 554 can also be put in the water sub-receptacle 503. A second water exit 538 is provided in the water reservoir 535. Water can flow from the water reservoir 535, through the water second exit 538, the filter 502, and into the water sub-receptacle 503. Water can also flow from the water second exit 538 on the other end and into the water sub-receptacle 503 directly. When the fan 501 is turned on, wind blows toward the filter 502 from the opening 531 and exits through the opening 532 so that it can be cleaned. Wind can also blow toward the filter 502 from the opening 532 and exit through the opening 531 so that it can be cooled down and/or added with freshener, or aromatic material while being cleaned. In the meanwhile, the water pump 540 is connected with the water reservoir 535 through a water pipe 543. When the fan 501 is turned on, the wind blows toward a water curtain (waterfalls) formed with the water in the water receptacle 2315 which flows downwardly from the second water exit 538.

The inventor of the present invention also has the following twelve US patents granted: U.S. Pat. Nos. 5,078,386; 5,088,373; 5,070,753; 5,286,535; 4,890,828; 5,203,743; 4,987,787; 6,978,564; 4,939,944; 5,448,007; 5,081,899; and 5,163,878. These patents can be used with the structures of FIGS. 29-31 of the present invention.

FIG. 32 shows another support seat 533 of the embodiments A-C of the present invention. A water wheel 529 is provided in the water sub-receptacle 503. When the fan 501 is turned on, wind blows from the wind inlet 531, toward the water and water wheel 529 in the water sub-receptacle 503 so

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that the water wheel 529 rotates and the water in the water sub-receptacle 503 moves, so as to clean the air. The number of the water wheel 529 can be one or more than one. The structures shown in FIGS. 8-31 and 33-38 also can be used with this structure.

FIG. 33 shows a sectional view of the water exit valve 321 in FIGS. 1-5, and the water exit valve 2321 shown in FIGS. 29-31. A hollow rod-shaped structure 5581 is provided in an outer housing 558 which has a larger diameter than that of the hollow rod-shaped structure 5581. The hollow rod-shaped structure 5581 is provided with a horizontal rod 5582 which in turn is provided with a communication hole 563 in which an abutment rod 581 is provided. A conical shaped retaining head 559 is provided on the top of the abutment rod 561 which is surrounded with a spring 560 on the lower portion thereof. One end of the spring 560 abuts against the hollow rod-shaped structure 5581, the other end of the spring 560 abuts against the bottom of the abutment rod 561. A soft stopper (which can be made of rubber, plastic, or other suitable material) 562 is provided under and around the conical shaped retaining head 559. The soft stopper 562 is of a shape similar to a bowl, with a lower edge abuts against the hollow rod-shaped structure 5581. When in use, the outer housing 558 is fit to the water receptacle (315 in FIGS. 1-5, 2315 in FIG. 29) at the water exit 2320. After the water receptacle 2315 is fit to the support seat 533, the abutment rod 561 of the water exit valve 2321 abuts the water level control rod 505 (FIGS. 29-31), the abutment rod 561 and the spring 560 are pushed upwardly, thus the soft stopper 562 is pushed released and water enters the water sub-receptacle 503. When the water receptacle 2315 is separated from the water sub-receptacle 503, the abutment rod 561 does not push against the spring 560 and the water stops exiting. When the water level in the water sub-receptacle is parallel with the horizontal rod 5582, the water in the water receptacle stops entering the water sub-receptacle.

FIGS. 34-35 show two extended mechanisms of the present invention. These two mechanisms also can be used with the structures shown in FIGS. 1-33, and 36-38.

As shown in FIG. 34, a light 509 is provided in the water receptacle 2315. A decoration 2345 is provided outside of the light 509. A transmission mechanism 512 (which can be connected to the shaft 507 or 2316 of FIG. 29) is provided on the decoration 2345 so as to move the latter.

As shown in FIG. 35, two transmission mechanisms 512 (which can be of the shape of two rollers and one of them can be connected to the shaft 507 or 2316 of FIG. 29) is provided in the decoration 2345. A light 509 is provided in the middle of the decoration 2345. When in use, as shown in FIGS. 34-35, the light 509 illuminates the pictures on the decoration 2345 so as to produce a visual effect which is an extra effect of the decorative humidifier of the present invention which can purify the air, humidify the air, and deliver the wind.

As shown in FIG. 36, a water receptacle 2315 is provided on the support seat 533 and is provided with a plurality of second holes 516 (at its bottom) which in turn is connected with the water pump 540 shown in FIGS. 29-31. A plurality of decorations 2345 are provided and are suspended (floated) in the water receptacle 2315. When the water pump 540 (in FIGS. 29-31) pumps water bubbles through the second holes 516 in the bottom of the water receptacle 2315, the water bubbles in the water receptacle 2315 pushes the decorations 2345 (e.g. a plurality of fishes) upwardly, which in turn sink downwardly (because of their own weights) toward the bottom of the water receptacle 2315. Thus the decorations 2345 can repeatedly move upwardly and downwardly. A light not shown in the drawings also can be provided to enhance the visual effects, which is an extra effect of the decorative

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humidifier of the present invention which can purify the air, humidify the air, and deliver the wind. FIGS. 34-35 can also serve as a background picture in this mechanism. The structures in FIGS. 1-35, 37, and 38 also can be used with this mechanism.

As shown in FIG. 37, a water receptacle 2315 is provided on the support seat 533 and is provided with a third water exit 520 and a first water inlet 519 at its bottom. The water pump 540 connects with the first water inlet 519. A plurality of decorations (in the shapes of jelly fishes) are provided and are suspended (floated) in the water receptacle 2315. When the water pump 540 pumps water into the water receptacle 2315 through the first water inlet 519, the water enters the support seat 533 through the third water exit 520. Thus the water can circulate between the water receptacle 2315 and the support seat 533, so that the decorations 2345 can move upwardly and downwardly repeatedly. A light not shown in the drawings can also be provided to enhance the visual effects, which is an extra effect of the decorative humidifier of the present invention which can purify the air, humidify the air, and deliver wind.

FIGS. 34-35 can also serve as a background picture in this mechanism. The structure in FIGS. 1-36 can also be used with this mechanism.

As shown in FIG. 38, a first magnetic device 521 is provided on the bottom of the water receptacle 2315 which in turn is provided on the support seat 533. A plurality of decorations 2345 are provided and are suspended (floated) in the water receptacle 2315. The decorations are provided with a second magnetic device 3452 respectively. When the first magnet device 521 is energized, the magnetic force thereof exerts a pushing force against the second magnetic devices 3452 (because of same polarity therewith) in the decorations 2345, so that the decorations 2345 are prevented from sinking to the bottom of the water receptacle 2315, and can move around in the water receptacle 2315. Each of the decorations are of different weights and therefore will move around at different heights in the water receptacle 2315. FIGS. 34-35 can serve also as a background picture in this mechanism. The structures 1-37 can also be used with this mechanism.

The foregoing description is provided for illustrative purposes only and should not be construed as any way limiting this invention, the scope of which is defined solely by the appended claims.

The invention claimed is:

1. An air-cleaning decorative humidifier, including a water receptacle, a water sub-receptacle, a device in the water sub-receptacle for transforming water into vapor, a bubbles making device provided in the water receptacle to make water bubbles.

2. An air-cleaning decorative humidifier as claim 1: The bubble making device is a pump making bubbles through a hole in the water receptacle.

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3. An air-cleaning decorative humidifier as claim 1: further comprising at least a decoration floated in the water receptacle.

4. An air-cleaning decorative humidifier as claim 1: further comprising at least a light.

5. An air-cleaning decorative humidifier, comprising: a mainly a support seat, a water receptacle, a fan, at least one decoration, and a transmission mechanism, wherein the transmission mechanism is provided to move the decoration.

6. An air-cleaning decorative humidifier as claim 5: further comprising wherein the decoration is provided outside of a light.

7. An air-cleaning decorative humidifier as claim 5: further comprising a filter.

8. An air-cleaning decorative humidifier, including a water receptacle, a device for transforming water into vapor, at least a vane included a rotary member in the water receptacle to move water upwardly and falling down.

9. An air-cleaning decorative humidifier as claim 8: further comprising a pump.

10. An air-cleaning decorative humidifier as claim 8: further comprising at least a decoration floated in the water receptacle.

11. An air-cleaning decorative humidifier as claim 8: further comprising at least a light.

12. An air-cleaning decorative humidifier comprising a device for transforming water into vapor, and at least a magnet.

13. An air-cleaning decorative humidifier as claim 12: further comprising at least a decoration floated in the water receptacle.

14. An air-cleaning decorative humidifier as claim 12: further comprising at least a rocking rod.

15. An air cleaning decorative humidifier, comprising a water receptacle, a water sub-receptacle, a fan, a device, wherein the device transforms water into vapor, and a plurality of decorations, wherein the decorations are provided and are suspended in the water receptacle, wherein each of the decorations have different weights therefore the decorations move around at different heights in the water.

16. An air-cleaning decorative device as claim 15: further comprising a pump.

17. An air-cleaning decorative humidifier as claim 15: further comprising a light.

18. An air-cleaning decorative device, comprising a water receptacle, a water sub-receptacle, a fan, and a water wheel in the water receptacle or water sub-receptacle.

19. An air-cleaning decorative device as claim 18: further comprising a filter.

20. An air-cleaning decorative device as claim 18: further comprising a pump.

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